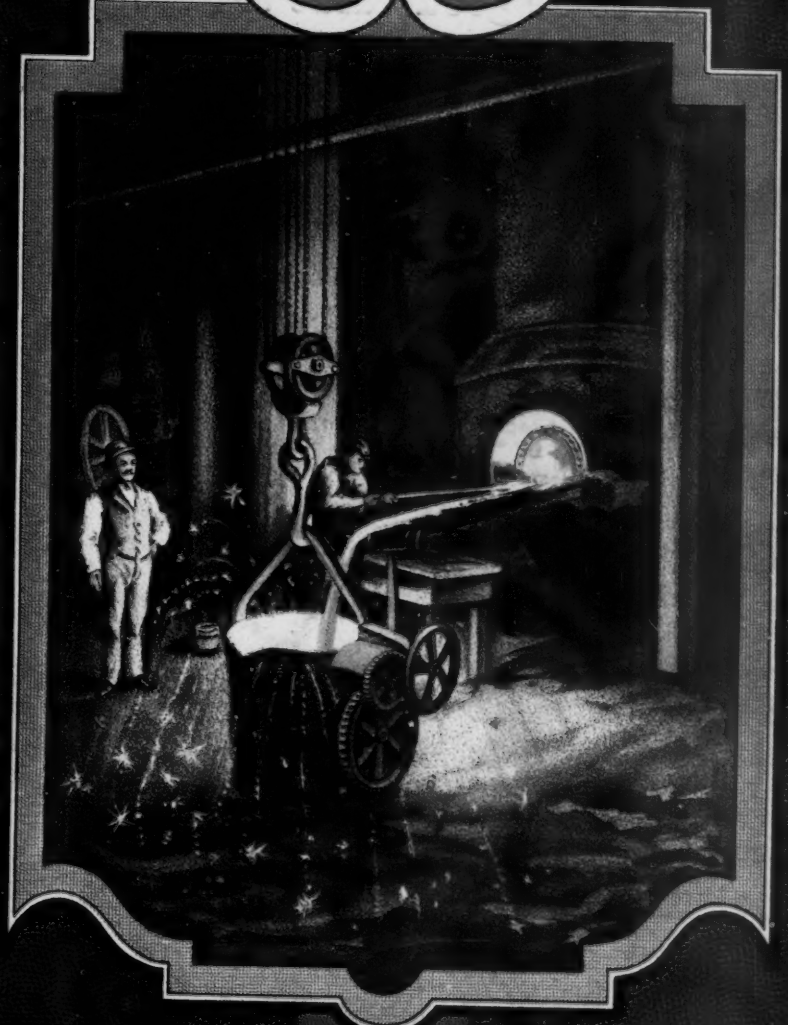
OL. 26. JULY 1905 No. 155.

THE FOUNDRY



PUBLISHED MONTHLY BY
THE PENTON PUBLISHING CO.
CLEVELAND.

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The only Foundry Supply House

Prompt shipments. Most liberal terms.
Right goods. Right Prices.
Our experience of over thirty years in the Foundry Supply business is of some good value to you.

We are headquarters

Fire Brick and Cupola Blocks.
Foundry Facings and Blackings.
Foundry Supplies and Equipments.
Pattern Makers' Tools
Core Room Supplies

The S. Obermayer Company

Cincinnati Chicago Pittsburg

Order from the nearest factory

"The house of quality and service"

"Are those cores ready?"
"Yes sir."

Will be the answer if your corerooms are equipped with

Millett Core Ovens

They work continuously and bake cores just right, in half the usual time. The hinged shelves swing in and out without a jar, keeping the oven closed whether shelf is in or out and yet giving easy access to any core.

Millett Core Ovens

avoid the loss and annoyance that comes from not having good cores ready when the Molders want them.

Send for list of users.

The Millett Core Oven Co.

Brightwood, Mass., U. S. A.

SALES AGENTS:

S. Obermayer Co., Cincinnati and Chicago. J. W. Paxson Co., Philadelphia.
J. W. Jackman & Co., London. J. S. McCormick Co., Pittsburg, Pa.

Men of Iron

Dollars in the Dump

Not in coin or currency, but in good available iron thrown out with your foundry refuse. Why not stop this leak by installing one of our Magnetic Separators? They pay for themselves in a few months. Separators shipped on approval to reliable parties. Many of the best and most modern foundries in this country are among our pleased customers. Write to us for prices and full particulars and ask for Bulletin 16.

We also build the famous Disk Type Magnetic Separators used in brass foundries and metal refineries. Best thing in the world for separating iron from brass and metal turnings.

Dings Electro-Magnetic Separator Co.

673-675 Smith St.

Milwaukee, Wisconsin

"Moore"
Anti-Friction Chain Hoist

Fig. 100.
"Moore"

With

Recently Improved Brake.

The new brake with which this Hoist is now equipped, increases its lifting efficiency 50 per cent. and gives it a smooth and free lowering movement.

Made in Eleven Sizes.

Ranging from 1-2 ton to 15 tons capacity. They are

Simple, Powerful, Easy Running and Durable.

Geared and Plain Yoke Trolleys.

Forged frame, four wheels, steel roller bushed.

Fitted to any size I Beam.

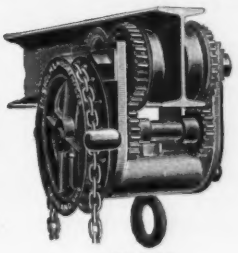


Fig. 112.
Geared Trolley.

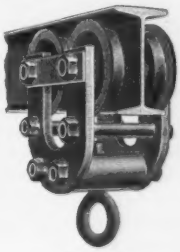


Fig. 113.
Plain Trolley.

Send for Catalogue.

The Chisholm & Moore Mfg. Co.

CLEVELAND, OHIO.

THE MOYER TRAMRAIL SYSTEM FOR EACH $100.00 OF ITS COST SAVES $300.00 EACH YEAR.

If a **big husky young man** should walk into your Foundry Office and say to you: "I will work for you **ten** hours a day, **six** days a week, **fifty-two** weeks in the year. I will guarantee to keep that up for **twenty years;** I will agree to do the work of any **ten men.** For all this I want you to pay me down now **One Thousand Dollars."**

Would you **hire** him? **Indeed you would!** You would be apt to say "Are there any **more** at home **like you?**

Now that's just what a **Moyer Tramrail System** will do for you.

It will do the work of from **ten to twenty** men; do it **quicker** and do it **better.**

It **won't** go off on a **strike;** it **won't** ask for a **day** or a **week** off just when you are **busiest.**

It will **take** up **no floor space.**

It will be **ready** and able to do **all** your **lifting** and **carrying all** day and **all** night too, for as **long as you are in business.**

A Tramrail System will **carry** your **pig iron** from your **stock yard** to **your cupola.**

A Tramrail System will carry your **molten metal** from the **cupola** to the **moulding floors.**

A Tramrail System will even **pour** the **metal into your flasks** if you want it to.

A Tramrail System will **clean** your foundry after pouring; it will **carry** the **castings** to the rumblers; it will **carry** the rumbled castings to the **sorting benches** and then on into the **stock** or **shipping rooms;** it will **carry** the **flasks** to be **stored away;** it will even carry your **sand** to the **moulding machines** or to the moulding benches.

All these things will it do and do them **so well** and **at such little expense,** that you will be wondering why you never thought of the system before.

A System of Moyer Tramrail will **pay for itself three times a year;** that is for **every hundred dollars you pay for a system you will get back three hundred dollars each year.**

Seems like a **big claim** to make now don't it? Well we are **ready to prove it by facts and figures.**

We have a special bulletin devoted to **Tramrails in Foundries** now on the press. It describes all kinds of systems, the flat rail and the I beam; tells which is the **best** for each **different purpose** and **why.**

To get a copy all you have to do is to write us on your business letter paper: **"Send us a copy of Bulletin No. 102."** We'll know what to do.

R. T. Randall & Co.

335 No. Second St.
PHILADELPHIA

GENERAL SALES AGENTS

101 Warren Street
NEW YORK

Warrants and Certificates

A WARRANT

A warrant is a storage receipt for 100 tons of pig iron, guaranteeing brand, grade, weight and delivery, free on board cars at yard where stored, the location of which appears on the face of the warrant. Ownership of this iron passes by transfer of the identical warrant issued against it

Warrants are issued by the AMERICAN PIG IRON STORAGE WARRANT COMPANY.

A CERTIFICATE

A Pig Iron Certificate is a receipt issued by The Farmers' Loan & Trust Company which certifies that they have received a warrant for 100 tons of pig iron, together with the amount of money required, according to the differential schedule issued by the New York Produce Exchange, to equalize it both as to grade, and as to the location of the yard in which it is stored, to No. 2 Foundry, stored on New York Harbor. Thus all iron for delivery on Exchange Sales, instead of being shipped to New York, is equalized to No. 2 foundry New York (the contract grade, and delivery point) by a money deposit which is held in trust, together with the warrant controlling the withdrawal of the iron.

DIFFERENTIAL SCHEDULE

The differential schedule is issued by the Committee on Pig Iron of the New York Produce Exchange. It enumerates the various brands of iron admitted to Exchange dealings. It also enumerates the different grades of iron which have been made deliverable on Exchange sales, either by analysis or by fracture grading. The differential schedule also indicates what amount of money per ton must be deposited with the Trust Company by a person depositing a warrant in order to obtain a certificate. The amount of money required, of course depends on the grade of iron covered by the warrant, and the location of the yard in which it is stored The object of the differential schedule is to enable **sellers** of pig iron, by referring to Exchange quotations, to determine what their iron would yield them at the furnace if sold on exchange, and to enable **purchasers** of pig iron, to ascertain what a certain brand and grade of iron would cost them, if obtained by purchasing a certificate on Exchange and using it to withdraw the required brand and grade of iron from a warrant yard.

WARRANTS vs. CERTIFICATES

The distinguishing features between warrants and certificates are:

FIRST: A warrant is a warehouse receipt for 100 tons of iron while a certificate is a Trust Company receipt for a warrant plus a certain amount of money.

SECOND: Certificates are dealt in on the New York Produce Exchange while warrants must first be converted into certificates, before delivery can be effected on an Exchange sale.

THIRD: The owner of a warrant can withdraw from the warrant yard, only the particular 100 tons of iron described on its face, while the holder of a certificate possesses a very much broader option, inasmuch as he can withdraw from the Trust Company, a warrant for any iron they hold on deposit in the group covered by his certificate.

EXCHANGE DEALINGS

All bids and offers are made for certificates and not for warrants, therefore, inasmuch as all certificates are issued on a basis of No. 2 Foundry New York, all bids and offers are regulated by that basis.

This, however, neither implies that the iron dealt in is nece sarily No. 2 Foundry nor necessarily stored on New York Harbor; on the contrary, the iron dealt in will probably include a large variety of grades, stored in warrant yards at the various points of production.

SUGGESTIONS

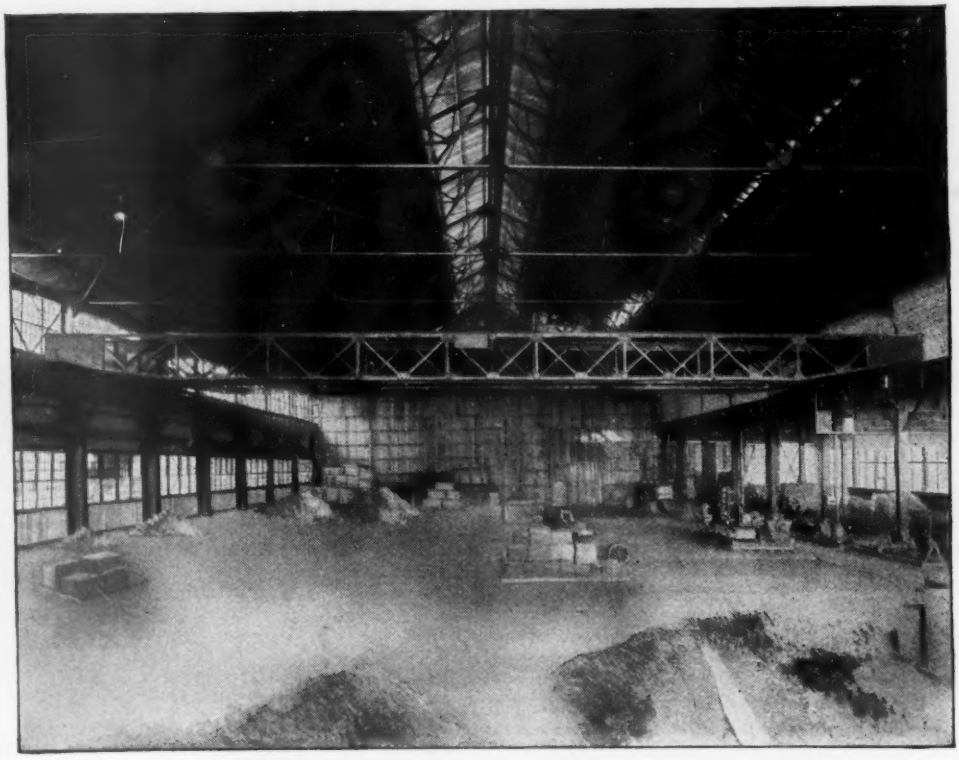
Every manufacturer in this Country who uses pig iron in his business, should subscribe to the daily market report issued by A L Russell, No. 71 Broad Street, New York City, and thus keep in intimate touch with the market for pig iron on the New York Produce Exchange, which not only reflects conditions more accurately than any other market, but shows what irons are available for immediate delivery from warrant yards, and at what prices they can be purchased.

Every consumer of pig iron should keep a stock of certificates on h nd at all times as a safety valve to protect himself against the unforeseen contingencies for which the iron market is famous.

Your further inquiries are cordially solicited.

AMERICAN PIG IRON STORAGE WARRANT COMPANY

44 Wall Street, NEW YORK CITY



Three-motor Electric Traveler, 10-tons capacity, 98-ft. span. Furnished McCormick Division, International Harvester Co., Chicago.

ELECTRIC TRAVELERS

CRANES OF ALL KINDS

ENGINEERS, DESIGNERS AND MANUFACTURERS

COMPLETE EQUIPMENT FOR

GRAY IRON, CAR WHEEL AND PIPE FOUNDRIES

MALLEABLE AND STEEL CASTING PLANTS

ALL TYPES

Catalog "F" on request

OVER 1500 IN USE

Awarded Gold Medal for Cupolas and Cranes at World's Fair St. Louis 1904.

WHITING FOUNDRY EQUIPMENT CO.

GENERAL OFFICE AND WORKS: HARVEY, ILL., U. S. A. (CHICAGO SUBURB)

THE FOUNDRY

Vol. 26, No. 5. *CLEVELAND, OHIO, JULY 1905.* *Whole No. 155*

Meeting of the American Foundrymen's Association in New York, June 6, 7 and 8.

The American Foundrymen's Association, with its affiliated branches, held its annual meeting in New York, June 6, 7 and 8, with headquarters at the Murray Hill Hotel. Most of the sessions were held in the Grand Central Palace, Lexington avenue and 43d street, though the morning and afternoon sessions on Thursday were held at Columbia University.

Business Meeting of the Associated Foundry Foremen.

The Associated Foundry Foremen as usual held their business meeting on the evening previous to the convention in the Grand Central Palace. This meeting was called to order by President Chas. H. Thomas, Secretary F. C. Everitt being in his place. There was an unusually good attendance and the business, including the adoption of the new constitution, kept the members busy until nearly midnight.

C. H THOMAS.

MINUTES.

The third annual meeting was called to order 8:45 p. m. June 5th, at the Grand Central Palace, President Chas. H. Thomas presiding.

The minutes of the last meeting were read and approved.

The president then appointed the following to act as a committee on nominations of officers for the following year: A. T. Williams, Philadelphia, Pa., chairman; W. S. McQuillans, So. Norwalk, Conn.; Geo. Martin, Ossining, N. Y.; E. B. Gilmour, Peoria, Ill.; S. M. Williams, Elizabeth, N. J.

The secretary's report was read and approved, after which, Henry M. Lane, editor of *The Foundry*, being perfectly familiar with the progress of the Foremen Patternmakers' Association, gave a very interesting report on the work of the Association during the last year, and stated that the prospects for a successful future were very encouraging.

The president then called for the reports of the local associations. Owing to the absence of five of the representatives only three reports were given, namely: New York, by S. M. Williams; Cleveland, by W. H. Nicholls, absent H. M. Lane, reported; Philadelphia, by W. O. Steele, all of whom reported excellent progress on the work of their associations.

The report on constitution was then given by the secretary in the absence of Mr. David Reid, chairman of the committee. A lengthy, but valuable discussion resulted in the adoption, with a few necessary changes, of the constitution as a whole, the construction of which was made to harmonize more with the object and transactions of the association. The report was then accepted and the committee discharged with thanks.

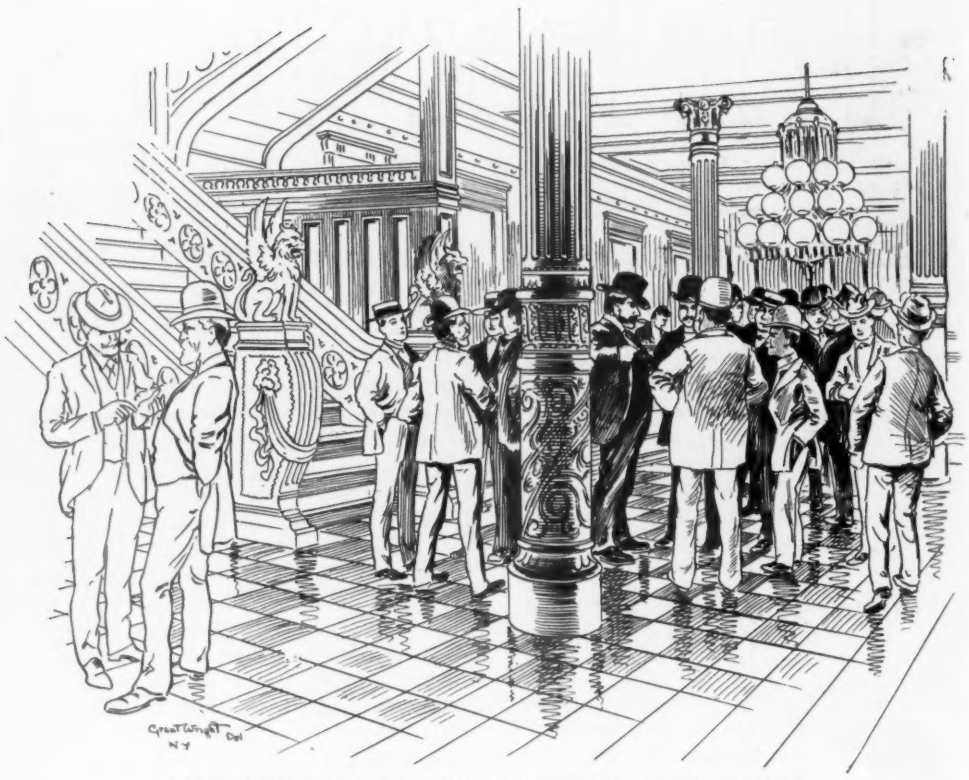
The report of the committee on charters was then read. Mr. Williams moved, and Mr. Gilmour seconded that the report be accepted and the committee discharged with thanks.

The report of committee on the "Henry Hansen Memorial" followed. Mr. Stickles moved and Mr. McPhee seconded that the report be accepted and the committee discharged with thanks.

Mr. McPhee moved and Mr. A. T. Williams seconded that the past presidents be elected to honorary membership. Motion carried. Mr. Arch. M. Louden, and Mr. C. H. Thomas being elected.

The report of the committee on nominations was then received and following officers nominated: President, Mr. David Reid, Canadian Westinghouse Co., Hamilton, Can.; first vice president, W. H. Nicholls, Hill Clutch Co., Cleveland, O.; second vice president, Hugh McPhee, Eaton, Cold & Burnham, Bridgeport, Conn.

Vice presidents for Erie Assn., W. F. Gru-



LOBBY OF MURRAY HILL HOTEL, CONVENTION HEADQUARTERS.

nan, Erie City Iron Works, Erie, Pa.; Milwaukee Assn., name to be furnished later; Chicago Assn., Mr. Thomson, Link Belt Co., Chicago, Ill.; Indianapolis Assn., W. S. Keller, Hetherington & Berner Co.; New York Assn., C. H. Thomas, New York City; Cleveland Assn., A. L. Hott, Interstate Foundry Co., Cleveland, O.; Philadelphia Assn., A. T. Williams, Enterprise Mfg. Co., Philadelphia, Pa.; Hamilton, Can., Assn., Frank Reid, D. Moore & Co., Hamilton, Can.; secretary-treasurer, F. C. Everett, The J. L. Mott Iron Works, N. Y.

Upon motion of the Association the secretary then cast the ballot and the above officers were elected.

On motion, the meeting adjourned 11:30.

Respectfully submitted,

T. C. EVERITT, Secretary.

New Constitution of A. F. F.

The Constitution and By-Laws as amended and revised by the committee appointed by the Indianapolis convention, June, 1904, and adopted at the New York convention, June 5, 1905.

CONSTITUTION.

ARTICLE I.

Name.

Section 1. The name of this association shall be the "Associated Foundry Foremen."

Sec. 2. The object of this association shall be solely educational. The same to be accomplished by collecting such information as will be of benefit to its members and to general foundry practice, the presentation of papers on appropriate subjects for discussion and the publication of such literature as may be deemed expedient.

Sec. 3. The Society shall neither endorse nor recommend any product consumed in foundries. This does not interfere with the members expressing their opinion on such subjects as affect the trade in general.

Sec. 4. This Society will work with and aid the American Foundrymen's Association, in establishing uniform methods and actions among foundrymen, as far as possible.

ARTICLE II.

Membership.

Section 1. The membership in this society

shall consist of the two classes—Active and Honorary.

Sec. 2. Any person who is, engaged as manager, superintendent, foreman or assistant foreman of a foundry, foreman coremaker or foreman patternmaker may become an active member. Any honorary member may become an active member on recommendation of the board.

Sec. 3. Any person who has held any of the above positions, or whose knowledge or service may be of value to this society may become an honorary member.

ARTICLE III.

Officers.

Section 1. The officers of this association shall consist of a president, two (2) vice presidents at large, together with a vice president from each local association, and a secretary-treasurer who shall jointly form the executive board of the association. The office of secretary shall be considered the headquarters of this association.

Sec. 2. The two vice presidents at large shall be elective officers and the presidents of the local associations shall be the remaining vice presidents.

ARTICLE IV.

Meetings.

Section 1. The annual meeting shall be held at the same time and place as the American Foundrymen's Association, arrangements for same to be made by the executive board, and the members notified at least three (3) months in advance of said meeting. Twenty-five (25) members shall constitute a quorum.

Sec. 2. Additional meetings may be called by the secretary at the written request of twenty-five (25) members, at the time and place stated by them.

Sec. 3. Meetings of the executive board may be called by the president or by any three (3) members of said board, and five (5) shall constitute a quorum.

ARTICLE V.

Amendments.

Section 1. This constitution and by-laws may be amended at any annual meeting by a two-thirds vote, by letter ballot.

Sec. 2. Notice of proposed amendments must be in writing and sent to the secretary at least ninety (90) days prior to the meeting. Such amendments will be printed and mailed to each member with letter ballot to be acted upon at the next meeting.

BY-LAWS.

ARTICLE I.

Election of Officers.

Section 1. The president, vice president and a secretary-treasurer shall be elected by ballot at the annual meeting, a majority of those voting being necessary to elect and will hold office for one year or until their successor shall have been elected or appointed.

Sec. 2. No member in arrears for dues shall be eligible for election.

Sec. 3. The officers elected shall assume their duties immediately upon receiving notice, by letter, of their election. In the case of a vacancy occurring in any office during the year, the executive board shall fill the vacancy within one month from the time it occurs, to complete the unexpired term.

ARTICLE II.

Duties of Officers.

Section 1. The president shall have general supervision over the affairs of the society, preside at all meetings and perform such other duties as usually devolve upon a presiding officer.

Sec. 2. The vice president shall perform the duties of the president during his absence or in case of a vacancy in said office.

Sec. 3. The secretary shall be, under the direction of the president, the executive officer of the society. He shall conduct the correspondence of the society and endeavor to obtain such information for the members thereof as will further their interests. He shall keep a complete record of all members and the class of work in which they are engaged. He shall see that moneys due the society are carefully collected and transferred to the custody of the treasurer. He shall carefully scrutinize all expenditure and use his best endeavor to secure economy in the administration of the society. He shall notify any member who is in arrears to the society and furnish the president with a list of those who are three (3) months in arrears. He shall endeavor to give each vice president a complete list of members in his district, both active and honorary, and furnish at the annual meeting a written report of the year's proceedings.

For his services he shall receive such compensation as may be decided upon by the executive board. The amount of said compensation not to exceed 10 per cent of the annual receipts of the Association.

Sec. 4. The treasurer shall have charge of all moneys and pay all bills, which have been approved for payment by the secretary. He

GROUP OF A. F. A. AND A. F. F. MEMBERS AND FRIENDS TAKEN AT COLUMBIA UNIVERSITY, JUNE 7, 1905.

shall keep regular accounts of all receipts and expenditures, which shall be open to the inspection of the executive board at all times.

Bond shall be furnished, the amount and arrangement for placing said bond shall be left to the discretion of the executive board.

Sec. 5. The executive board shall manage the affairs of the society to the best of their ability.

ARTICLE III.

Admission to the Society.

Section 1. All applications for membership shall be made on a blank furnished by the society and addressed to the secretary, or the same may be effected through the respective local associations. It shall be accompanied by the amount of the annual dues.

ARTICLE IV.

Dues.

Section 1. The annual dues of active members shall be two (2) dollars, payable in advance.

Sec. 2. Honorary members shall not be subject to the payment of dues.

Sec. 3. No member will be entitled to the services of the society beyond the period for which his dues are paid.

Sec. 4. Every member shall, upon the payment of his annual dues, receive a certificate of membership, which will constitute an official receipt and be a primary guarantee of membership in the Associated Foundry Foremen. It shall state the date of expiration, at which time a new membership card shall be issued to the holder upon payment of his annual dues.

Sec. 5. The executive board may, for sufficient cause, excuse from payment of annual dues any member who from ill-health, advanced age, or other good reason assigned, is unable to pay his dues.

Sec. 6. Every person admitted to the society shall be considered as belonging thereto and liable for the payment of all dues until he shall have resigned, been expelled, or have been relieved by the executive board.

ARTICLE V.

Charters.

Section 1. The object of the charters is to have all local associations affiliate with and have each and every member of said locals members as individuals of the national body in order to increase the interest and concentrate the workings of the various locals to the sole object of the national association.

Sec. 2. The body of the charter is as follows:

This is to certify that the Foundry Foreman's Association of.....is a section of the Associated Foundry Foremen of North America and being members by right of this charter are entitled to all the benefits and privileges accrued therefrom, the same being controlled by the constitution of the national body together with all local by-laws set aside for their guidance.

In testimony whereof are hereunto affixed the seal and the names of the president and secretary of the Associated Foundry Foremen of North America.

This.....day of.....190..

No..... .....President

(Seal.) .....Secretary

Sec. 3. On application of five or more members to form a local association, a charter will be granted, said charter empowering said local to transact such business, in their respective localities, as will be of benefit to the progress of the society, and to examine and receive members. The names of said members to be for-

AN INTERESTED TRIO.

warded with the regular fee, two (2) dollars, to the national secretary within ten (10) days.

Sec. 4. The charters will remain in force as long as the.....local affiliates, and its members remain in good standing with the national association.

ARTICLE VI.

Discipline.

Section 1. The executive board shall have power to hear and determine upon the conduct of its members for any infraction of its rules and regulations and for professional misconduct calculated to affect the good name of the society or interfere with order and harmony.

Their findings shall be laid before the society at the next meeting for final action.

ARTICLE VII.

Order of Business.

Section 1. The order of business to be observed at the annual meetings shall be as follows:

1. Reading of minutes of the last meeting.

GROUP OF A. F. A. AND A. F. F. MEMBERS

2. Announcement by the president of special committees as follows:
   a. Committee of five (5) to nominate officers for the following year.
   b. Committee of three (3) to audit the accounts of the secretary-treasurer.
3. Reports of officers and standing committees.
4. Unfinished business.
5. New business.
6. Report of special committees:—No. 2 a and b.
7. Election of officers.

ARTICLE VIII.

Amendments.

Section 1. These by-laws may be amended under the rules stated in article 5 section 1 of the constitution.

OPENING SESSION OF THE A. F. A.

The tenth annual meeting of the American Foundrymen's Association convened at the Grand Central Palace on Tuesday morning, June 6. The association not being the guest of either the city or the local foundrymen, the usual opening formalities were dispensed with. President Chris J. Wolff called the meeting to order promptly at ten o'clock

President's Address.

"The most instructive and pleasurable of our public assemblies are those which engage all of our members in the association's common good. This being our tenth annual convention, we justly look back with pride on the vast strides that have been made in an educational way by our organization since its inception in Philadelphia in 1896. Among the advantages of this association to its members, and by no means the least, is the formation of agreeable acquaintance.

CHRIS J. WOLFF.

True, we have not obtained the highest desire of some, but no candid estimate of us by the outside world has fallen below excellent.

Our aim has always been to help educate the world as far as we can in our chosen field. The good work of this organization has not all been accomplished without criticism, for associations, like men, should not expect praise without envy until they are dead. The present time is one characterized by organization for mutual support in whatever direction this may tend. Only that organization which gives more than it receives will survive and really be useful to the State. In the foundry industry only those organizations which are founded on the wide open door principle, for interchange of thought and experience, will serve the country best. Our own association invites three factors in the trade—the owner, the superintendent or foreman, and the molder, patternmaker or other workman—into full membership, giving them all equal rights and the opportunity to get acquainted, to exchange views and experiences in the carrying out of every part of the foundry program. For that reason we invited the foundry foreman's organization to become part of us, and welcomed them as such, after we had satisfied ourselves that they were an educational institution only and had no ulterior motive antagonistic to this fundamental idea of ours. The results have been most gratifying It would be advisable for our association to let the foundry owners know by circular letter or otherwise of the foremen's association and have them encourage their foremen to join it. Every foundry owner who has taken the trouble to get where he can learn something relative to advanced ideas in foundry practice has added to the value of his plant as a producer. Every foreman who has opened his mind to what other people have found to be good becomes a better employe and loses the predilections tying him to the narrow views of the foundry floor. Every molder who wishes to learn the details of all parts of the foundry business puts himself in line for speedy promotion. We therefore invite every one connected with the foundry to join our organization and help to build it up on these lines. Especially we invite the foundry owner to get out of his shell and join on the common ground with his employes, where he can learn again what he has often forgotten since he himself graduated from the floor. He will find himself repaid by an increase of loyalty on the part of his employes through the feeling of mutual sympathy and interest engendered by the principles of our association.

"In my anxiety to respond promptly and fully to the confidence which you placed in me I urged such measures as the objects of the association provided for or conditions justified, and have ever stood ready to execute the

will of the majority. It will be observed that, though the president is held responsible for every policy and act of the association, yet his authority is absolutely dependent on the support of the officers and committees. Differences of opinion or even disagreements on methods should not always be regarded as opposed to the association's interests, and in this spirit I most heartily appreciate the co-operation and assistance afforded me. My sincere thanks are hereby due and tendered to each of the officers and members for the earnest devotion with which you have supported my efforts."

Secretary's Report.

A very active year of Association work is now behind us. The foundry industry is truly waking up, and he who doubts it, may simply glance at the programme of the present meeting to satisfy himself that this is so. Nevertheless, this does not mean that we have received the support from the industry that is due our work and ideals. The disturbances of the foundry world have been frequent and severe. The changes in organization of the individual plants have been many. New blood is coming in everywhere, and with it a closer understanding of expense and income, good and bad methods of work, and a restlessness on the part of the buying public, which requires the closest study on the part of the gray iron founder, to overcome.

THE SECRETARY READS HIS REPORT.

Our steel casting and malleable plants are full of orders today, but the same cannot be said of the iron foundries. Hence attention is given in a greater measure than ever to improving the quality of the foundry output, and hence science is playing a greater part in our work than we might suppose.

Many of us will recall the discussion on the purchase of pig iron we had while in Buffalo. It was just the year of the turning from fracture buying to chemical analysis. Today what founder does not scrutinize the analysis cards of his shipments to satisfy himself that all is well, even if he holds to the old way of doing business.

The trade school question is coming up stronger and more persistent all the time, and well can we wish it success and that it may come quickly. The Government itself is waking up to one of its functions, and the Bureau of Standards promises to become a most important aid in helping to eliminate the uncertainties besetting details of manufacture, where all are concerned equally. Even today the question of standards, such as we have been preparing for the chemist and foundryman, is being studied by this splendid undertaking of the Government; and we wish it all success.

In view of the meagre support given our efforts to get out fuller transactions, the Journal of the Association had to be abandoned, and occasional issues of papers and discussions substituted therefor. No one regrets this more than your secretary, though the burden the Journal entailed on all that contributed so ably to its literary and technical success, was a heavy one.

Through the generous arrangement with the *Foundry*, whereby our papers are printed at cost, and can thus be distributed cheaply to the membership, we have succeeded in removing the debt of the Association, and the financial statement is now as follows:

Income from dues, sales, interest, and standardizing bureau	$2,208 85
Expenditures:—	
Debt of last year	$ 995 04
Printing	52 20
Postage	217 00
Transactions	135 15
Expense	5 00
Secretary's office	400 00
Standardizing bureau	337 52
Total	$2,141 91

leaving a balance of $66.94 to our credit.

An analysis of the expense will show a few things of interest to us. First of all the cost of the transactions has been very low. This unfortunately also means that our members get much less than formerly, and hence the annual dues of the Association should be materially decreased. The experiment of giving a better Journal having failed through lack of support, and the fact that trade journals are giving much better material now than heretofore, precludes any attempt, or should do so, to go back to the old method again. There are today more journals devoting space to foundry matters than formerly, and they have the advan-

tage of advertising matter to offset the printing costs, which is something we as an association should not go into. I would therefore strongly urge a reduction of the annual dues to even as low as $3.00, thus giving our present members a better equivalent, and also tending to increase our membership.

From the item of postage, it will be seen that with very little expense for the transactions, the correspondence has increased enormously. Your secretary's office easily reflects the waking-up process above referred to. If all the foundrymen who have requested advice, or wanted information could have been induced to become members, we would have a better showing in that respect than is the

MOREHOUSE AND FIELD TALK OVER THE FAN QUESTION.

case. It seems, however, that the idea of supporting an association which works hard for just such betterment of the industry, is considered secondary to the immediate gain derived by asking, and taking the chances of getting the information or advice for nothing. Such, however, is life, and only the ideals we subscribe to, of bettering the industry at the expense of our time and energy, whoever may profit thereby, hold us above discouragement and giving up the work in despair.

The bright side of the problem lies in the universal recognition of the work of the Association. England and Germany have organized similar associations, freely following our lines of endeavor.

Our membership today is 294, or 16 more than last year, which in spite of the drain on the resources of foundrymen demanded by other movements, speaks well for our loyalty to the cause. Even India is represented in our membership list. The Association, however, should be much greater numerically, for there are nearly 5,000 foundries to draw from, and surely most of them can stand a little more knowledge generously distributed about the place.

You will receive separate reports from the Foremen's and the Metallurgical Sections. These movements are now rapidly approaching a stage when they can act independently of us and we are proud to have assisted in interesting these branches of the industry in studying their field closely and finding betterment and success therein.

I would therefore recommend the continuance of the work as heretofore, by committees, the printing of the transactions under the favorable arrangement with the *Foundry*, the reduction of the dues, and a continued effort on the part of our members to assist the secretary in increasing the interest and support of the industry in our chosen work.

Respectfully submitted,

RICHARD MOLDENKE, Secretary.

Pattern Insurance.

It will be remembered that the committee on pattern insurance reported a blank form for taking care of patterns last year and outlined a general scheme for pattern insurance. The report of the committee this year was read by Dr. Moldenke, in the absence of the chairman, Frederick Conlin, of Bethelehem, Pa. In the course of his remarks he said the insurance interests of the country have an agreement by which is case of fire they never pay more than ten per cent of the value for the loss of patterns, which is often an injustice to the foundryman, because frequently the patterns are worth more than the foundry itself. He recommended that all members of the association press the insurance interests harder to get this injustice corrected, and suggested that a system be substituted whereby losses would be paid on a depreciation of 5 per cent per annum for metal patterns, and 10 per cent for wooden patterns, the date of the last use of the pattern to be that from which the depreciation is dated. An illustration in point was made of the system in vogue on railroads for insuring rolling stock,

PULLEY JONES

in which the value of the car is depreciated each year it is in service.

The report of the committee on coke tests was also made by the secretary. H. E. Field, of Mackintosh, Hemphill & Co., Pittsburg, drew up the plan of operation and Dr. Moldenke carried on the tests. A series of cokes which were made at the exposition were used to melt iron under standard and identical conditions in the cupola of the model foundry at the World's Fair. The results of the 19 tests made will be published by the Government later. The secretary added that the lesson to be learned was that if every foundryman watched closely the method of charging and adapting the cupola to the particular quality of coke used they might get much better results than they do, and it would be no longer necessary to swear by Connellsville coke as the only thing to use. For instance, a very light coke which was tried burnt out so quickly in the bed that the iron being brought in contact with the blast burned away over 60 percent. On the other hand, a very heavy coke took so long to burn that very unsatisfactory results were obtained.

L. G. BLUNT.

The committee on sand beds for molds reported progress and was continued.

Report of Committee on Foundry Trade Schools.

The chairman of the committee on trade schools was absent, but the report was presented by W. H. MacFadden, of Pittsburg. The report dealt wholly with the Carnegie Technical School, and was as follows:

The Carnegie Technical Schools expect to have ready for operation this fall a portion of its buildings. Among the first buildings to be erected will be that one which contains the foundry. This foundry will be equipped with the best modern appliances, and supervised by an instructor of experience in both the practical and theoretical side of foundry practice, aided by such assistants as he may need.

Two courses will be established; a day course for the students in Applied Science, who wish to ultimately specialize in one of the engineering branches, or in foundry practice. Their instruction will be thorough, on the theory and practice of molding, construction of the cupola and furnaces, the technology of the fuels, the metallurgical chemistry underlying the mixes, construction of the flasks, the making of cores, and such familiarity with foundry equipment in general as will enable them to see the underlying principles on which they operate.

In addition to the above technical instruction, general instruction will be given in physics, chemistry, mechanical drawing, English, mathematics, costs and business organization. A limited number only can be admitted this year for this course of instruction.

The applicants for admission will be tested by entrance examinations.

The evening course in this foundry covers, in the same number of lesson hours and therefore a greater number of years, practically the same ground that is covered in the technical branches, but merely deals with the general branches in an elementary form. This night course for instruction in molding and foundry practice is projected primarily for the benefit of those already engaged in that occupation. Preference will be given to those who are employed in foundries in the daytime.

"YOU SEE IT'S JUST THIS WAY."

The course will be not less than three years in length for night students, and it is hoped that the employing founders will insist upon their apprentices and helpers attending with regularity.

Admission for special instruction in this night course is also conferred upon any journeyman molder already employed in a foundry, or out of employment, who desires the theoretical instruction and understanding of the fundamental principles which are necessary for him to advance himself, as a more skillful molder or to raise himself to the position of foreman of molders. This night course of instruction will be thorough and consist largely of laboratory constructions, directly attached to the foundry, or in the foundry itself.

DAVID SPENCE.

In no instance will emphasis be laid upon the student applicant to pass a difficult entrance examination as it is the opinion of the school authorities that the employers have already examined and qualified to the fitness of the applicant, since said student is already in the employ of said manufacturer.

A series of general lectures on sand, on iron, graphite, silica and on basic open-hearth steel, brass, copper, and other castings will form a part of the instruction, and these lectures all who are interested can attend.

Blowers, Piping and Cupolas at the Plant of the Michigan Stove Co.

After all the business had been transacted on Tuesday morning, Mr. W. J. Keep, of Detroit, Mich., read his paper on "Blowers, Piping and Cupolas at the Plant of the Michigan Stove Co." This paper provoked considerable discussion.

W. J. KEEP ANSWERS A FEW INQUIRIES.

L. G. Blunt, of the Westinghouse Electric & Mfg. Co., Pittsburg, asked if Mr. Keep had noticed the oxidation of silicon and carbon in the cupola at the melting ratio he mentioned, and whether he had kept any record of the losses. Also if he found by varying the amount of fuel and blast whether a cheaper grade of pig iron could be used. Mr. Keep replied that they had made some very accurate tests on a week's work on the melting losses only. He called attention to the fact that in a stove foundry he found it very difficult to keep any record of the losses, mentioning that they swept the foundry every night, picked up all the scrap, riddled the sand, and extracted the chippings, etc. Every day's record was kept by itself, so that they knew absolutely all the time what they were doing. In this way, he found that there was about 4½ percent loss from all sources. The loss of silicon was only about ¼ of 1 percent, and the carbon loss very slight.

W. A. Jones, of Chicago, wanted to know what cupolas Mr. Keep used, and was told that they were of the old cylinder type. The same gentleman also asked if any data had been kept as to a comparison between the outlet of the tuyeres and the capacity of the blast pipe. He was informed that the area of the tuyeres is about two and three times as large as that of the blast pipe.

J. B. NAU.

David Spence, of the Greenlee Foundry Co., Chicago, asked the size of the tuyeres as they enter the cupola. Mr. Keep answered that in their No. 3 cupola the tuyeres are almost continuous. Nos. 1 and 2 cupolas, he added, have tuyeres 4½ in. by 7 in., each cupola being equipped with sixteen.

Notes on Pipe Foundries and Suggestions on Metal Mixers for Foundry Purposes.

Mr. J. B. Nau, of New York City, next read his paper entitled "Notes on Pipe Foundries and Suggestions on Metal Mixers for Foundry

MRS. CLARK FISHER AND DAUGHTER.

Purposes." While this paper contained a large amount of matter which was very interesting and which caused some discussion in the lobbies afterward, there was no official discussion upon it.

Retort Coke Melting Ratios.

C. M. Schwerin, of the Milwaukee Coke & Gas Co., Milwaukee, Wis., followed with his paper on "Retort Coke Melting Ratios." This paper proved very interesting to the members and was followed by considerable discussion. L. G. Blunt, of Pittsburg, asked if by increasing the quantity of coke on the charge from one to ten to one to seven, in both cases putting in a good bed, whether a cheaper grade of pig iron could be used. Mr. Schwerin's answer was that after a certain amount of coke had been put in there was no gain, but for very light work by pouring the iron hot, it had less tendency to take a sand chill. "It is true," he continued, "that a softer grade of iron can be used when running a high bed and keeping the melting points up than if the melting points were allowed to go too near the tuyeres by running a low bed or not putting sufficient coke on the charges, as the blast will oxidize the iron, making it harder."

C. M. SCHWERIN

Production Costs.

Mr. Ellsworth M. Taylor of Boston next read his paper on "Production Costs." Mr. Taylor's remarks were heartily applauded and Mr. David Spence, of Chicago, told of the method of keeping track of costs in vogue in the plant of which he is superintendent. It was thought expedient, however, to reserve further discussion of this subject for Thursday, when more members would be present.

ELLSWORTH TAYLOR.

Making a Molder.

Henry M. Lane, of Cleveland, next read the paper entitled "Making a Molder," which was on the program for Wednesday afternoon but which was read and discussed Tuesday morning, so as to be sure and finish the discussion on other papers later in the week.

In the discussion that followed, August T. William, Philadelphia, told the convention that the firm with which he is employed undertook some time back to put into operation a plan to educate the boys and men in its employ

SOME OF THE REPRESENTATIVES OF THE PRESS.

A DEMONSTRATION OF THERMIT.

along the lines suggested by Mr. Lane, and that the attempt was a signal failure. Mr. William was of the opinion that the influence of labor unions upon apprentices destroyed in a large measure the efforts of the employer in his educational work. The fact also that so many concerns confined their shops to the manufacture of specialties prevented the teaching of the molder's trade in all its details. To make a competent workman this speaker thought that manufacturers should adopt a plan by means of which a boy could, after learning all the details of the work in the shop of his first employer, be transferred to another shop, where a different product was made.

H. M. LANE ANSWERING QUESTIONS.

L. G. Blunt told of the technical school maintained by the Westinghouse Electric & Mfg. Co., at Pittsburg, for the benefit of its employes, the instructors in which were the best engineers in the employ of the company. In this institution, three classes are maintained. One of two years, one of three years and one of four years. The first mentioned is intended for college graduates, and is a sort of post graduate course; the second is for boys and men who have had a common school education, and the four-year course for those whose education has been very limited. The latter students pass through every department of the electrical company's works, learning the details of each thoroughly. Finally, they reach the dynamo test department, which is the senior class. By this time, they have received an excellent training in the manufacture and operation of electrical machinery and can be classed as first-class workmen.

In answering the above, Mr. Lane states that Mr. William evidently misunderstood the paper, as it would be impossible for any ordinary manufacturing concern to put into effect just the course outlined in the paper without going to a very great expense, and without the necessary books and preliminary training the experiment would be almost sure to fail.

American Pig Iron Warrant System.

The session Tuesday afternoon was opened with a talk on the latest developments of the American Pig Iron Warrant System for foundry use, by George H. Hull, of New York. At the close of his talk Mr. Hull answered a number of questions concerning the working of the system.

Foundry Foremen's Session.

After the paper on Pig Iron Warrants President Wolff turned the meeting over to the Associated Foundry Foremen, vacating the chair to C. H. Thomas, president of the section. After a brief speech by Mr. Thomas Secretary Everitt read his report for the year

GEO. H. HULL TALKS ON PIG IRON WARRANTS.

Report of the Secretary of A. F. F.

The close of another year brings us to a statement of the conditions and affairs of our association, and the general conditions of shop affairs. The year ending June 6, 1904, found us with 177 members and five local associations. During the past year the membership has increased to 278 and we have added three local associations to our number.

The organization of the Foreman's Club of Cleveland, July 8, 1904, has attracted no little attention on the part of the association and its friends. They have been, and are, doing excellent work in their locality and deserve rec-

ognition as being among the most progressive of the local associations.

No less can be said of the Associated Foundry Foremen of Philadelphia and vicinity, which association was organized Oct. 17, 1904. The various subjects that have been taken up at the regular monthly meetings have been wisely selected and have resulted in very profitable discussions.

The fact that the formation of these associations was prompted by the foundry operators is in itself very significant and affords encouragement to the extent that we, as a body, should show our appreciation by putting forth every effort to improve the general conditions of the foundry.

The organization of the Foundry Foremen of Hamilton, Canada, March 11, 1905, was an event of unusual interest. This is practically a new field for the work of our association and consequently resulted in the more strenuous efforts of our worthy vice president, Mr. Reid, to effect an organization. There are, at present, comparatively few members, but the progress thus far made is of marked value and significant of permanency and continued growth.

Charters were granted, as a result of the committee appointed at the Indianapolis convention to the eight local associations and all, but one, replied and accepted. The Indianapolis association decided not to consider the National Association for the present.

A most natural procedure has been taken up by the foremen's club of Cleveland, namely, the enrollment of the "foremen patternmakers" as active members of their association.

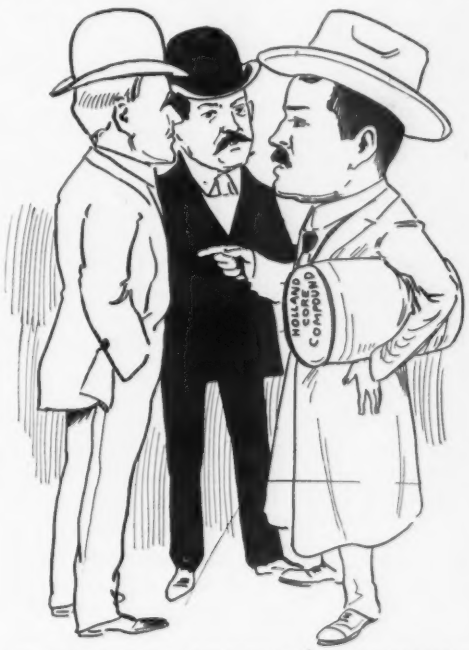
This question was placed in the hands of a committee for investigation and in reply to a communication from Mr. Henry M. Lane, editor of *The Foundry*, and a member of the committee, the president and secretary stated that due to the present constitution the best that could be done would be to enroll the foremen patternmakers as honorary or associate members and present the matter at the June convention. The proposition was referred to Mr. Wm. Parry, chairman of the patternmakers' section of the American Foundrymen's Association, who replied very favorably and offered any assistance that would be instrumental in effecting a union.

SIMON KEMP, THE SAND MAN.

The idea has been very favorably received wherever presented and when we consider that the foundry and pattern shop are more closely related than any other two departments it seems that it would be to the advantage of all concerned to enroll the foremen pattern makers as active members of the Associated Foundry Foremen.

The work of the Foremen's association is unquestionably the discussion and development of the productive side of the foundry. It is necessary, then, that we, as members of this association, introduce some method whereby we may arrive at some definite result for the advancement of general foundry practice.

Up to the present time the various local associations have selected different subjects of importance and discussed them in a general way, but we have arrived at no definite conclusions through which all our members may be equally benefited. When we consider that 50 percent of our members are so located as to be unable to attend the local meetings, and find comparatively few of these valuable discussions published, we recognize at a glance the importance of providing some means to furnish definite data from which our members may obtain satisfactory results.



CLINCHING THE ARGUMENT IN THE DISCUSSION ABOUT VENTLESS CORES.

In consideration of this fact, arrangements were made in February with the Penton Pub-

SOME OF THE WHISKERS AT THE CONVENTION.

lishing Co. which has enabled us to include in the annual dues a year's subscription for *The Foundry*. 6,700 notices were sent out to this effect in April to all foundries in the United States and Canada. The appreciation of this offer seems rather discouraging inasmuch as only 66 have made replies, 25 of these being new members.

The many subjects that are daily brought to our notice and need much valuable consideration to produce satisfactory results can be placed in the hands of special committees for proper investigation.

The following subjects may be selected for the work of such committees:

Cupola Management, Foundry Chemistry, The Core Department, The Cleaning Department, Molding Machine Practice, subdivided according to the class of work; Stove Plate and Heaters, Sanitary Work, General Jobbing, Foundry Equipment, Provisions for the Comfort of the Men, Pattern System, Foundry Records, etc.

To obtain the most profitable results on the above subjects we might suggest that a committee of three or five be appointed, or we might distribute the different subjects amongst the local associations with instructions to make a thorough study of the subjects assigned, in all their details, make such experiments that may be of value, enter upon such correspondence as will aid in rendering an instructive report at the next annual meeting and incidentally consult with the managers and owners as to the advisability of adopting such methods as may be selected by the committees.

A. WILLIAM EXPRESSES HIS OPINION.

We might also plan, for our next convention, a period of longer duration, *i.e.*:

The Morning Session.—Report of committees selected to investigate the subjects presented. Said reports to be made on standard forms and on vote of the convention, be printed and distributed to all members of the association.

The Afternoon Session.—The reading of papers.

The Evening Session.—Business of the association and election of officers.

We have another valuable suggestion, namely, the circulation of papers. The plan being outlined as follows:

Have all papers from the various local associations sent to the secretary, copied and mailed to the remaining number of locals for their discussion. The paper with the discussion again returned to the secretary to be compiled and sent to all members of the association. The discussion is, without doubt, the most important part of a paper as it often brings to light valuable points that have been omitted by the writer. This point in itself brings to our notice, at once, the value of such a plan and would give every member an equal opportunity to profit through the work of the association.

Whatever the plan be that is adopted, we have first to consider the cost necessary to complete the work. This brings us to a statement of the finances of the association, and with the permission of the treasurer I have included his report.

Cash on hand June 9, 1904....	$51 99	
Total receipts to June 5, 1905..	426 73	
Total disbursements		$368 21
Cash on hand June 5, 1905....		110 51
	$478 72	$478 72

Number of members, dues unpaid....	102
Amount outstanding dues.....	$294 03
Report of Membership—	
Honorary members, June 9, 1904....	10
Active members, June 9, 1904.....	167
	177

Honorary members June 5, 1905.....	16
Active members, June 5, 1905.....	262
Resigned 4	
Dropped 7	
Total	278

Respectfully submitted,
F. C. EVERETT, Secy.

New York, June 5, 1905.

Papers Read.

After the Secretary's report, Mr. Benjamin D Fuller, of Allegheny, read a paper entitled "Needed in the Business." As no discussion followed, David Spence, of Chicago was called upon to read his paper entitled "Things We Need in the Foundry." The gist of this paper was that instead of cutting one another's prices we should aim to make the very best quality of castings possible, and get a good price for them. Mr. Spence characterised cutting prices as one of the greatest evils the foundry business has to contend with; as it involves poor work, and slovenly methods in general.

E. B. GILMOUR.

A paper on "The Use of Plaster of Paris in the Foundry," by Edward B. Gilmour, of Peoria, Ill., was next taken up, and as there was no discussion this was followed by two papers by Archibald M. Loudon, of Elmira, New York, entitled "A Simple and Economical Method of Molding Propeller Wheels," and "A Successful Foundry Combination." In the discussion of the first paper, one man asked

763 MILES TO CUYAHOGA FALLS.

Mr. Loudon if he knew of any cause in which a plaster of Paris match had been used for a pattern for a big propeller wheel. Mr. Loudon replied that plaster of Paris would be too expensive for this purpose.

The paper on "Fan and Blower Tests," by H. E. Field, of the MacIntosh-Hemphill Company, of Pittsburg, was next read, but discussion on this paper was postponed for the session next morning. The Secretary then told W. W. Sly, of the Sly Manufacturing Company, of Cleveland, that he could have just ten minutes to present his paper on "Shot Iron," as the members were getting hungry and it would not do to keep them too long. Mr. Sly had not prepared his paper in writing before the meeting, but had had some analyses made and had tried some experiments to test the value of shot iron. He stated in brief that the shot iron was just as good as any of the scrap which came from the sprues, provided it was properly treated.

A. M. LOUDON.

If the shot iron is allowed to lie in the dump while the coke remaining in the dump burns out the shot will absorb an excess of sulphur and become so oxidized that it is worthless, but if the dump is thoroughly quenched the shot will not absorb sulphur, and will be as good as any other scrap from the cast.

Some of the analyses which Mr. Sly read were as follows: He took a grate bar and had both ends analyzed. The burnt end analyzed as follows: Silicon, 2.23; sulphur, 0.23; phosphorus, 0.838; manganese, 0.41; combined carbon, 0.36; graphitic carbon, 1.88. This gives a total carbon of 2.24. The unburned or stub end of the bar analyzed as follows: Silicon, 2.16; sulphur, 0.111; phosphorus, 0.819; manganese, 0.44; combined carbon, 0.07; graphitic carbon, 3.19.

This shows that the burned end of the bar had had almost no change in silicon, contained more than double the amount of sulphur, that the phosphorus and manganese were only changed slightly, and that the total carbon had been reduced over one percent. This loading of the iron with sulphur, and reduction of the carbon

D. J. THOMAS.

would be enough to damage the iron greatly. Mr. Sly also presented the following analyses of shot iron, and sprues from the same cast. The shot iron contained silicon, 1.90; sulphur, 0.077; phosphorus, 0.684; total carbon, 3.58; while the sprue contained silicon, 1.88; sulphur, 0.074; phosphorus, 0.57; and total carbon, 3.200 percent.

From this it will be noticed that the composition is almost identical and that the shot

AUGUST WILLIAM, PHILADELPHIA, PA.
VICE PRES. A. F. F.

is just as good scrap as the sprue. Mr. Blunt, in discussing the paper, stated that it was the magnetic oxide contained in burnt grate bars which rendered it useless, and that it was also the magnetic oxide in burnt shot iron that rendered it useless. He stated that they used all of their shot iron without difficulty. Mr. Sly promised to work this paper into more complete shape and present it later.

Wednesday Morning.

The main lecture room of the chemical laboratory of Columbia University was well filled when President Wolff called the meeting to order. Owing to the absence of the various members of the faculty at the summer schools, Dr. Moldenke welcomed the assembly in behalf of the institution, of which he is an alumnus. His remarks were as follows:

Mr. President, Ladies and Gentlemen.

I have been honored with the pleasant task of welcoming you to Columbia University. I have been asked to do so on behalf of this great institution because the dean and professors are all away with the summer classes in mine and mountain, shop and smelter, since the young men who are later on to manage our establishments are required to get into touch with actual conditions in business life as early and often as possible. They thus become of greater immediate value to you when they have left their Alma Mater.

I take peculiar personal pride in having been designated to receive you, as I myself am one of Columbia's sons, and as the Secretary of your great and important association, enjoy the distinction of being a resident lecturer to the classes here on Foundry Practice.

The twenty years that have passed since I was graduated from this institution of learning, have seen wonderful changes in America's university life. You behold the stately pile of magnificent structures, some of them still

N. H. McPHEE, BRIDGEPORT, CONN.
VICE PRES. AT LARGE A. F. F.

rising, all about you here. They are but the outward evidences of the work that is being done. Within these walls, in daily touch with famous men of warm-hearted interest for each and every student, there is developed a culture which the university life gives the faithful searcher after truth. The personal element in the daily contact with men of splendid character, such as is always met with within our great universities and technical schools, becomes the chief element in forming the minds

of our young men, and places them on the road of life, leading to solid and righteous citizenship.

Here in the laboratories, workshops and museums will be found everything that science and art can provide, to teach the principles underlying the utilization of Nature's forces for

W. F. GRUNAU, ERIE, PA.
VICE PRES. A. F. F.

the good of man. All that a university can teach us, is, after all, only how to learn. How to observe correctly, make the proper deductions therefrom, and apply our knowledge to the best advantage. It is this training of the mind along the paths of logic, and correct thinking, that give the university bred man, if he is otherwise capable in business, the great advantage he enjoys, in being capable of filling important places earlier in life than has been the case heretofore. What does not ten years of life mean to us in these strenuous days.

It is the aim of all our universities and technical schools to train the youth of the nation to utilize our wonderful resources in the most economical way. Hence only the best methods for turning out high class material are taught. The student is made self-reliant, and learns to make the best use of what he finds, whatever the conditions may be that surround him. Thus do we aid in stemming the shameful waste of the nation's economic resources, and not only are we making good metallurgists and engineers, but high spirited citizens.

We will be taken through the mechanical and metallurgical laboratories later in the day, and see the many and varied appliances which facilitate the study of methods and results in our chosen field.

Columbia welcomes you as an educational association, and with us, wishes that we were not almost the only body of men seeking to elevate an industry which forms but one small part of the vast system on which rests the prosperity, and comfort of the world. Columbia invites you to send your sons to round off their characters and acquirements before entering the competition of man to man in the race for wealth and station. She wishes to see your good influence extended still further, and continue to benefit the great foundry industry even more than it has already done.

Columbia welcomes you one and all, hopes that when the day is over that it may be passed to the credit side of your experiences, and wishes you to keep her in warm remembrance, and use her resources wherever she may help you in the problems of your daily work.

W. H. NICHOLLS, CLEVELAND, O.
VICE PRES. AT LARGE A. F. F.

Discussion on Fan and Blower Tests.

F. W. Stickle, of Waterbury, Conn., opening the discussion of the paper on "Fan and Blower Tests," read on the previous day by H. E. Field, Pittsburg, inquired whether the time of tapping the slag had been the same in both tests, and whether the volume of air had

been sufficiently uniform to insure the same conclusions.

Mr. Field replied that the work had been performed by trained men and that everything possible had been done to render the test absolutely correct. The volume of air had not been measured.

Mr. Stickle remarked that the catalogue figures of manufactures did not always agree with the actual volume of air furnished by their machines, and that in some cases the claims were purposely made lower than measurements seemed to warrant. The power necessary to melt a given quantity of iron depended very largely upon the time required. He had found that while a certain volume of air is necessary, it is possible to double the output by increasing the volume furnished. The increased resistance due to rising temperature might also increase the power required very materially. In his opinion unsatisfactory results were very often due to failure to supply a sufficient volume of air. The best policy was always to melt the iron as rapidly as possible.

David Spence, of Chicago, asked about the number of ounces of pressure employed in the tests, and spoke of the influence of the physical properties of the coke upon the melting process. He had found that with a relatively light coke the melt proceeds more rapidly, apparently because the carbon is consumed more readily than is the case with a denser fuel. Referring to a custom of beginning the operation with 10 ounces blast pressure and increasing to 16 ounces, he personally believed that quite as rapid work could be done by keeping the pressure uniformly at 12 ounces.

Foundry and Pattern Shop Standards.

William H. Parry, Brooklyn, N. Y., read his paper at this meeting on "Foundry and Pattern Shop Standards," in which he urged the adoption of measures to secure greater uniformity in the matter of dimensions, draft, spindles, etc.

W. H. PARRY.

H. M. Lane, of Cleveland, said that he had for some time been trying to find out whether anything had been done toward the standardization of flasks. He had written a number of letters and had received many interesting replies. It had been suggested that the Association take the matter up. Some rational standards for snap flasks, pins and pin holes are especially desirable. He thought that what had been done in the case of standardizing the size of machine catalogues might also be done in foundry practice.

E. B. Gilmour, Peoria, Ill., suggested that the matter presented fewer difficulties than appeared at first sight.

Dr. Moldenke proposed that a committee be appointed devoted entirely to the interests of the patternmakers, a committee to report from time to time on standardization of patternshop-foundry practice. The motion was adopted. A second motion for similar action for the standardization of flasks aroused considerable discussion.

Benj. Fuller, Allegheny, Pa., said it would be difficult to tie down the foundryman to standard flasks. Flasks must be of such form as to accommodate the pattern. W. H. Parry disclaimed any intention to dictate as to size and shapes, but he saw no reason why something could not be done to eliminate odd sizes, sometimes involving differences of small fractions of an inch. August T. William endorsed Mr. Parry's remarks. He said it was often necessary to change the flasks for the molding machine every time a new pattern was used. Chas. J. Caley, Bridgeport, Conn., suggested that the motion be limited to flasks of certain sizes only. F. W. Stickle, Waterbury, Conn., believed in standardization in every way possible. He said that foundrymen had trouble enough without a lot of odd flasks. Eugene W. Smith, Chicago, thought that a standard in even inches could be set to which machine men could agree in time. One of the worst features of modern practice was, in his opinion, too much crowding of flasks.

The motion to provide a committee to look into the standardization of flasks prevailed.

H. M. Lane, Cleveland, gave a brief synopsis of his paper on the "Care and Storage of Patterns."

Paper on Thermit.

W. M. Carr of the Goldschmidt Thermit Co., New York, entertained the assembly with a practical demonstration of the use of thermit. He described the different kinds of this product, the variety used for ordinary welding being a mixture of metallic aluminum and iron oxide. When ignited, the oxidation of the aluminum produces an intense heat, in ordinary quantities approximating 5000 degrees F. or 3000 degrees C., the iron oxide being reduced to the metallic form. In order to show the

W. M. CARR.

intensity of the heat produced, a quantity of the material was ignited and the products of the reaction allowed to flow upon an iron plate, one inch thick, burning a hole through it instantly. A second experiment was a butt-weld of two sections of two-inch pipe. In the discussion which followed, Mr. Carr explained a number of interesting details connected with the manipulation of thermit. The reaction as ordinarily carried out produces about 50 percent of a mild form of steel containing about .1 percent of carbon derived from the graphite of the crucible. Nickel thermit is employed for the introduction of a definite quantity of nickel into cast iron or steel. About ½ percent of nickel in cast iron kettles increased the resistance to acids and alkalis to a marked degree. The demonstrator explained that while it was possible to use thermit in welding cast iron, it was in this case necessary to employ a larger proportion of the material than with steel.

A paper by G. N. Prentiss, Milwaukee, Wis., on thermit practice closed the morning session.

Noon Intermission.

At 12:30 the meeting adjourned until after dinner, and the members and guests repaired to the University Commons, where they were served with a substantial luncheon. One of the enterprising supply men had distributed little feathers upon which was printed "The J. D. Smith Foundry Supply Co. We don't stick our customers," and upon the end of which a burdock burr was attached. He had succeeded in making pretty much every one look like Indians, by the number of colored feathers that were attached to them. This feature and various other little tricks played by the supply men served to keep everybody in a good humor. The Obermayer Company distributed a little button with a piece of steel in the back so as to form a clicker or cricket, and these were in evidence everywhere by their clicking.

J. S. SMITH, THE FEATHER MAN.

After luncheon the party assembled on the library steps where a photograph was taken. They then inspected the laboratories, admired the campus and buildings, and visited all parts of the university.

Afternoon Session.

The afternoon session was called to order by the President at half past two. Several of the papers presented in the afternoon were illustrated by stereopticon. The first one was on "The Variation of the Properties of Alloys," by Percy Longmuir, of Sheffield, England. This was contributed by The Metal Industry, and read by Dr. Scholl. The lantern slides showed the apparatus used, photographs of the specimens, the microstructure of the different alloys, and a chart showing the results. There was no discussion of the paper though it had been extremely interesting to all present.

ONE OF SMITH'S VICTIMS.

The next paper was a description of "The Use of Thermit in a Railroad Shop," by James F. Webb, of Elkhart, Ind. This was also illustrated by a number of lantern views. There was quite a little discussion of the paper, mainly in the shape of questions which Mr. Webb answered. In the discussion the fact was brought out that in his more recent work, Mr. Webb has used molds made of fire-brick, the bricks being chipped or cut to such a shape that they were fitted about the piece to be repaired and then clamped in position; the joints being closed with fire clay. By using a porous brick, such a mold is practically self-venting.

Microscopic views of a large number of well known varieties of core sands were a feature of a paper on "Core Sands," by J. S. Robeson, Camden, N. J. The author made clear that the occasional failure of cores prepared with any given binder was frequently due to the character of the core sand employed. He gave a number of successful formulæ and related several

LITTLE GRAINS OF SAND.

1 AND 2 SNAP SHOTS ON THE FERRY. 3, BROWN WAS CHAIRMAN OF THE ENTERTAINMENT COMMITTEE AND LOOKED AFTER THE LADIES. 4, GOING TO THE SESSION. 5, A GROUP RETURNING FROM HARRISON.

experiences in which a slight modification of the mixture converted vexatious failures into conspicuous successes.

A discussion which caused more or less amusement concerned the possibility of casting cylinder jackets with cores without vents. One member remarked that it was all he could do to make cylinders of that kind with vents, to say nothing of ventless cores. The gentleman to whom the original claim that the thing could be done (P. M. Baumgardner, president The Holland Linseed Oil Co., Chicago), has been ascribed, failed to appear, and the discussion died for lack of opposition.

The next afternoon, however, when visiting the plant of the International Steam Pump Co., it was discovered that they were making jacket cores without vents, exactly as Mr. Baumgard-

ner had described to some of the members previous to Wednesday afternoon's session.

Thursday Morning.

With the exception of a discussion of about half an hour's duration on the paper read by Ellsworth M. Taylor of Boston, on "Production Costs," the meeting Thursday morning was devoted entirely to the election of officers for the coming year, and to the transaction of new and unfinished business. Mr. Taylor was given the opportunity by the president to answer any questions on the subject of his paper which any of the members might be interested in asking. Following the lead of August T. William of Philadelphia, the discussion took the line of whether it was advisable to keep a detailed system of the costs connected with the manufacture of small castings. The opinion prevailed among the foundrymen who participated in the discussion, and was coincided in by Mr. Taylor, that in a great majority of cases it is neither practicable nor advisable to attempt to do this; that where very small castings are concerned it is better to get a fair average cost and charge accordingly. A periodical check on the cost of manufacturing such castings every one or two years would be sufficient to keep the price in line. Mr. Taylor thought it would be a saving to the proprietor if such labor was put on the piece basis.

After the discussion ended, the convention voted its thanks to Mr. Taylor, on motion of Mr. William, for the very able manner in which he had answered the questions asked.

Metallurgical Report.

The report of the metallurgical section was next read by H. E. Diller, secretary, which is as follows:

During the past year your committee has formulated a method for determinating the silicon in cast iron, and is now at work on the question of the total carbon. The following is the method which your committee recommends to be the standard of the association, for the determination of silicon in pig iron and cast iron:

"Weigh one gramme of sample, add 30 c. c. nitric acid, (1.13 sp. gr.); then 5 c. c. sulphuric acid (conc.). Evaporate on hot plate until all fumes are driven off. Take up in water and boil until all ferrous sulphate is dissolved. Filter on an ashless filter, with or without suction pump, using a cone. Wash once with hot water, once with hydrochloric acid, and three or four times with hot water. Ignite, weigh, and evaporate with a few drops of sulphuric acid and 4 or 5 c. c. of hydrofluric acid. Ignite slowly and weigh. Multiply the difference in weight by .4702."

H. E. DILLER.

In recommending the above method, it was recognized that it is almost an impossibility to get chemists to use a standard method in their daily work. Hence the above method, as recommended, is intended primarily as a check method in case of dispute between different laboratories, or as between buyer and seller.

Hence a method, accurate in every point was sought, shortness being sacrificed to some extent to insure accuracy or the chance of error by a careless operator. Little in the above is left to the judgment of the chemist.

It will be further recognized that in the purchase and sale of pig iron or castings under specification, that standard methods are essential in order to allow the parties of both parts to make their determinations with the assurance that, on the score of method, they are on the same footing.

Miscellaneous Business.

Under the subject of new and unfinished business, Dr. Moldenke brought up the question of reducing the dues of the Association. He suggested this step not only as an inducement to increase the membership, but because he felt that since the discontinuance of the Journal the members were not getting full value for the $10 they were paying. To bring the matter to some sort of conclusion, he made a motion that the dues be reduced to $3 per year. This proposal was not favorably received and after some discussion the original motion was amended to make the annual dues $5, with the proviso that this amount be charged to members of the different sections

as well as to members of the Association. This was carried.

Following this action, the Association voted its thanks to Columbia University, to the contributors of the papers read, to the foundry supply men and to the entertainment committee.

The nominating committee, composed of W. A. Jones, of the W. A. Jones Foundry & Machine Co., Chicago, Ill.; J. P. Golden, Golden Foundry and Machine Co., Columbus, Ga.; George H. Lincoln, Lincoln Foundry Co., Boston, Mass.; C. H. Thomas, president of the Foundry Foremen's Section, and A. V. Slocum, National Car Wheel Co., Pittsburg, which was appointed at the Tuesday morning session, was called upon for its report.

In proposing Mr. West's name for president, the chairman of the committee, W. A. Jones, spoke in high praise of Mr. West's services to the association and of his work as an investigator and contributor of original articles on foundry practice. He said: "As chairman of the nominating committee, I am pleased to state that the Association has thought it wise to select at each of its conventions a gentleman whose home is the city in which the convention will next convene. In this way, the president will preside in his own city. This presents many advantages and as far as can be seen few disadvantages. And working with this end in view, it affords me great pleasure to place in nomination for president of this Association a gentleman whom you all know, a gentleman who is well known throughout this country where foundry interests are known or even discussed; whose books and papers have a national reputation, and a gentleman who perhaps more than any other person excepting alone, Dr. Moldenke, has done more and worked harder for the interests of this Association."

THOS. D. WEST.

The secretary was instructed to cast the vote of the convention for the election of Mr. West as president and for the election of the other candidates presented for the offices named. This was done and W. A. Jones and C. H. Thomas were appointed to escort Mr. West to the chair.

The customary expressions of appreciation and thanks for the honor were made by the incoming and outgoing officers, and following the precedent established at the first meeting, C. H. Wolff, the retiring president, was made an honorary member of the Association.

THREE FROM THE HUB.

The vice presidents elected for the ensuing year are as follows: New England States, Harry A. Carpenter, A. Carpenter & Sons, Providence, R. I. New York & New Jersey, H. Van Atta, Supt. J. L. Mott Iron Works, New York. Penn., Delaware, Maryland and District Columbia, A. V. Slocum, National Car Wheel Co., Pittsburg. Michigan, Ohio, Kentucky, Tennessee, A. K. Beckwith, estate of P. B. Beckwith, Dowagiac, Mich. Indiana, Illinois, Missouri, Kansas, Colorado, Arizona, New Mexico, Utah, Nevada and California, David Spence, Greenlee Foundry Co., Chicago. Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Idaho, Nebraska, Wyoming, Washington and Oregon, Adam Bair, superintendent of foundry, C. M. & St. P. Ry., Milwaukee, Wis. Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma and Texas, J. P. Golden, Golden Foundry & Machine Co., Columbus, Ga. Canada, T. J. Best, Warden, King & Co., Montreal.

Foundry Foremen's Section.

Chairman, David Reed, Canadian Westinghouse Co., Hamilton, Can.

Secretary, F. C. Everitt, J. L. Mott Iron Works, New York.

Metallurgical Section.

Chairman, R. S. MacPherran, J. I. Case, Threshing Machine Co., Racine, Wis.

H. J. McCASLIN.

Secretary, H. E. Diller, Western Electric Co., Chicago, Ill.

Patternmakers' Section.

Chairman, H. J. McCaslin, Wellman-Seaver-Morgan Co., Cleveland.

Secretary, Wm. H. Parry, National Meter Co., Brooklyn, N. Y.

Auditing Committee.

J. S. Seaman, S. H. Stupakoff and Wm. Yearl, all of Pittsburg.

Invitations to hold the 1906 convention in Cleveland were received from the mayor, chamber of commerce, foundry foremen's society and several large manufacturing interests of that city, and were read by H. M. Lane, of Cleveland.

An invitation was also received from the Philadelphia Foundrymen's Association asking that the convention for 1907 should convene in that city.

WE ARE EXTENDED AN INVITATION TO MEET AT TORONTO.

Mr. L. L. Anthes, of the Toronto Foundry Co., of Toronto, Canada, also stated that the Canadians would be glad to have the Association meet with them in 1908, and that he hoped to present a formal invitation later for the 1908 convention to be held in Toronto.

The meeting adjourned, and in the afternoon the members visited the works of the International Steam Pump Co., Harrison, N. J.

Excursion to Harrison, N. J.

About a hundred of the members and guests of the association set out from hotel headquarters Thursday afternoon to visit the great plant of the International Steam Pump Co., at Harrison, N. J., under the guidance of Dr. Moldenke. Clear skies and brilliant sunshine made up for the disagreeable weather of the earlier days of the convention.

J. S. McCORMICK.

At the works the delegation was received and conducted about the establishment by representatives of the firm, and the busy scenes in and about the foundries, some familiar and others suggestive of improvements in home plants, were, to many, a welcome change from the hustle and bustle of New York streets.

An interesting feature in connection with the visit was a demonstration by the Goldschmidt Thermit Co. of the manner in which nickel thermit could be used for introducing nickel into iron or steel castings. They also demonstrated the use of ordinary thermit for heating the risers to keep them open.

As mentioned, those who had been carrying on the ventless core discussion found such cores in use at the plant. By the use of the proper sand, and a suitable binder they had succeeded in solving the difficulty.

The Convention Core Room.

In order to make things seem homelike at the convention, some of the supply men provided a very good working core room in the basement adjoining the grill room. The Thos. W. Pangborn Co. had the largest exhibit and centainly went to a great deal of trouble to make a remarkable display. They had a steam pipe brought from the boiler room and had one of the Hanna post screen shakers in operation riddling sand. In addition there was displayed a complete line of the several types of shakers made by the Hanna Engineering Works, of Chicago. Adjoining the post shaking screen exhibit they had an exhibit of the Hammer core machine. The machine was so connected that it could be driven either by motor or hand, and was in operation making the various sizes of cores. At the back of the space there was an exhibit of corundum wheels of various sizes and shapes, together with samples of corundum ore, showing the product as mined and manufactured by the National Corundum Wheel Co., of Buffalo, for whom the Pangborn Co. is exclusive Eastern sales agent. In fact, they hold an exclusive Eastern sales agency for each of the lines which they had on exhibition. Among points of especial interest in connection with the general supplies on exhibition by this company, there was a Williamson universal double swivel machinist's vise, which attracted considerable attention.

ARTHUR W. WALKER.

EXHIBIT OF THE THOMAS W. PANGBORN CO.

The Diamond Clamp and Flask Co.'s Exhibit.

This exhibit occupied a table in the center of the room, and consisted of one of their single pull universal belt shifters, and a core machine which has recently been designed and is now being perfected by this company. For agricultural machinery there are a large number of small cores required having a conical print on one end. To make these a machine has been devised in which the sand is fed to the machine by a spiral screw turned at right angles by a deflecting plate and forced out through an opening which can be turned down horizontally or placed in a vertical position. When the core is forced up vertical, its own weight tends to keep it in place. After the desired length has been forced out, a set of dies are brought together by a suitable lever so as to compress the lower end of the core, thus forming the print.

McCORMICK PUMPING VULCAN INTO REID.

This company also had a very neat souvenir in the form of a little folder, closed by one of their patent pattern dowels.

Exhibit of the Falls Rivet & Machine Co.

This company had on exhibit one of their 6-inch machines, which had been fitted up with a large fly wheel, so that it is possible to make 6-inch cores 24 inches long in 12 seconds by

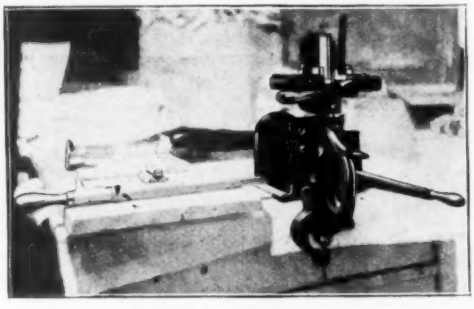


EXHIBIT OF THE DIAMOND CLAMP & FLASK CO.

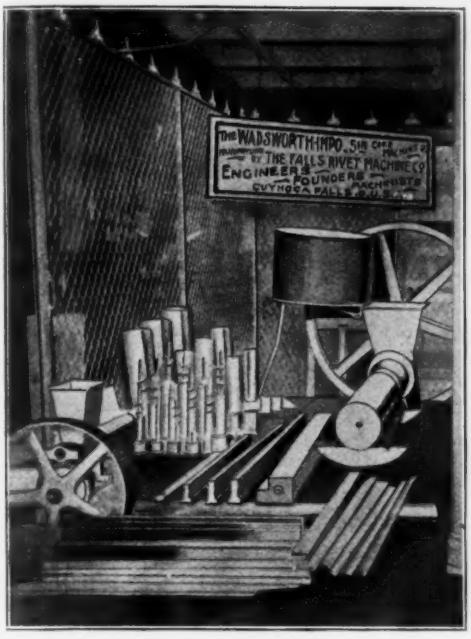


EXHIBIT OF THE FALLS RIVET & MACHINE CO.

hand. They also had on exhibit a large number of odd sized and shaped cores which had been made with special dies, for different customers requiring special forms of cores. Some of these were very interesting indeed, and showed that a large amount of careful thought had been expended in designing the equipment for producing them.

Convention Notes.

While at this convention there was not the amount of sight-seeing, entertainment, etc., that has marked some of the previous gatherings, a number of the members stated that they had never seen so much interest taken in the papers read, and so much general discussion. Evening sessions had purposely been avoided in order that the members might have time to take in the various New York attractions.

S. D. THOMPKINS.

The supply men were conspicuous in heading parties to the various places of amusement. The sand men, the Smith crowd, and some others could undoubtedly give a pretty good account of everything that was doing at Coney Island.

J. S. McCormick and some of his Pittsburg friends guided a large party to the Hippodrome one night, and in fact, every night saw a good number there.

Just to keep the Sly Mills in memory and to please his old friends, Mr. W. W. Sly appeared in the hotel lobby one day with a box under his arm and distributed aluminum cigar holders, each filled with three good smokes.

At the first day's session Mrs. Clark Fisher and her daughter were present. Mrs. Fisher owns and operates the Eagle Anvil Works, Trenton, N. J. She took a lively interest in the discussions, and in conversation with some of the members afterwards told a number of reminiscences which occurred at her own plant.

The members who were present at the Milwaukee Convention will remember Miss Ella M. Jones, whom many of them thought was probably the only woman in the United States running a foundry. It would be interesting to know how many foundries in the United States are owned or operated by women.

JOHN HILL.

Mr. John Hill, of the Hill & Griffith Co., Cincinnati, presented all of the members at the Columbia University meeting with a very ornamental watch fob from which was suspended a metal imitation of the barrel of the facings for which his company is famous.

Henry E. Pridmore and his faithful right hand man, D. E. Egan, made a half-mile sprint from the railroad station at Harrison to the plant of the International Steam Pump Co., so as to hold all the members up at the door that they might present each with a handsome gold pencil with their compliments. Unfortunately, Mr. Pridmore was so secretive in his movements that the cartoonist did not succeed in catching him. Probably Mr. Pridmore was too busy entertaining his friends.

Mr. S. D. Tompkins, of the Smooth-on Mfg. Co., was present at all of the sessions, and met many old friends, and made some new acquaintances.

Mr. Charles J. Caley, of the Russell & Irwin Co., of New Brighton, Conn., distributed a very useful souvenir in the shape of a case-hardened screw driver which was gold plated. The head of the screw driver had stamped on it in a very neat design, the trade mark of the Russell & Irwin Co.

Those in Attendance.

Adamson, Robert, Farrell Fdy. & Machine Co., Ansonia, Conn.

Anderson, N., Matthew Addy & Co., New York.

Anthes, L. L., Toronto Fdy. Co., Ltd., Toronto, Can.

Ayers, E. M., Zanesville, O.

SOME OF THE SOUVENIRS.

Bair, A. W., C. M. & St. Paul Fdy., Milwaukee, Wis.

Bartlett, S. L., Elizabeth, N. J.

Baumgardner, P. M., president Holland Linseed Oil Co., Chicago.

W. W. SLY ASKS THE BOYS TO SMOKE UP.

Bean, A. P., The T. H. Symington Co., Corning, N. Y.

Bean, W. R., The T. H. Symington Co., Corning, N. Y.

Beckett, Jas. A., Hoosick Falls, N. Y.

Beckwith, A. K., Beckwith Estate, Dowagiac, Mich.

Beckwith, Mrs. A. K., Dowagiac, Mich.

Bell, Daniel, Dominion Coal Co., Glace Bay, N. S.

Bernhard, B., Garwood Foundry, Garwood, N. J.

Beverly, T. L., Cohoes Iron Fdy. Mach. Co., Cohoes, N. Y.

Blau, L. G., Golden Foundry & Machine Co., Columbus, Ga.

Blunt, L. G., Westinghouse Foundries, Pittsburg.

Blythe, Robert, Walker & Pratt Mfg. Co., Boston.

Bougher, J. K., J. W. Paxson Co., Philadelphia.

Bowe, Jas. J., Eddy Valve Co., Waterford, N. Y.

Bradford, Jas., Lord & Burnham Co., Irvington-on-Hudson.

Brant, W. J., Chicago Flour Co., Pittsburg.

Brewer, W. M., Colonial Fdy. & Machinery Co., So. Norwalk, Conn.

Brown, Aug. W., Abendroth Bros., Port Chester, N. Y.

Brown, L. K., L. K. Brown Molding Sand Co., Zanesville, O.

Brown, L. S., Springfield Facing Co., Springfield, Mass.

Bullard, H. W., Poughkeepsie Fdy. & Mach. Co., Poughkeepsie, N. Y.

Burgen, J. J., Lane Mfg. Co., Montpelier, Vt.

Burns, John C., Pond Pool Co., Plainfield, N. J.

Burr, John W., The Burr & Houston Co., Brooklyn.

Burr, Mrs. John W., Brooklyn.

Caley, Chas. J., Russell & Erwin Mfg. Co., New Britain, Conn.

Caley, H. L., Hart & Crouse Co., Utica, N. Y.

Carr, W. M., Goldschmidt Thermit Co., New York.

Carr, Mrs. W. M., New York.

Chapman, Eugene M., Wm. M. Crane Fdy. Co., Peekskill, N. Y.

Cherrie, Jas., Friction Pulley & Mach. Wks., Sandy Hill, N. J.

Clark, A. L., American Brake Shoe & Foundry Co., Mahwah, N. J.

Colvin, C. H., Colvin Foundry Co., Providence.

Cooledge, Edw. R., Thos. W. Pangborn Co., New York.

Crawford, Robt., S. L. Moore & Sons Co., Elizabeth, N. J.

Crivel, Geo. F., F. B. Stevens, Detroit.

Cunningham, W. P., American Bridge Co., Philadelphia.

Cushing, Geo. H., H. B. Smith Co., Westfield, Mass.

D. F. EAGEN.

Dancer, J. C., General Electric Co., Schenectady, N. Y.

Danziger, J. L., chemist, New York.

Davie, Jas., Acme Fdy. Co., Brooklyn.

Dette, W. S., The Arlington Co., New York.

DeWolfe, W. H., P. & F. Corbin, New Britain, Conn.

Diller, H. E., Western Electric Co., Chicago.

Dorman, Robert, Garwood Machine Co., Garwood, N. J.

Eagan, D. F., Pridmore Molding Machine Co., Boston.

English, W. C., *The Iron Age*, Boston.

Everitt, F. C., J. L. Mott Iron Works, New York.

Fasy, Jos. I., W. W. Lindsay & Co., Philadelphia.

Fenwinkle, W. A., Electric Controller & Supply Co., Cleveland.

Field, H. E., Mackintosh, Hemphill & Co., Pittsburg.

Findley, A. I., *The Iron Age*, New York.

Fisher, Harriet, Eagle Anvil Works, Trenton, N. J.

Fisher, S. H., Harrisburg Foundry & Mach. Wks., Harrisburg, Pa.

Fitzpatrick, Wm. M., The S. Obermayer Co., Pittsburg.

Folant, W. S., Colonial Fdy. & Mach. Co., So. Norwalk, Conn.

Foster, W. C., M. J. Drummond & Co., New York.

Fraser, John, Mackintosh, Hemphill & Co., Pittsburg.

Frohman, E. D., The S. Obermayer Co., Pittsburg.

Frohman, H. F., The S. Obermayer Co., Cincinnati.

Fuller, Benj. D., Westinghouse Elec. Co., Pittsburg.

Gartside, W. N., Diamond Clamp & Flask Co., Richmond, Ind.

Gilbert, H. P., Piqua Flour Co., Piqua, O.

Gilbert, H. W., N. Y. C. & H. Ry. Foundry, Frankfort, N. Y.

Gilbert, L. D., Frick Co., Waynesboro, Pa.

Gilmour, E. B., Globe Foundry Co., Peoria, Ill.

Gilmour, J., Foundry Equipment, New York.

Golden, J. P., Golden Foundry & Machine Co., Columbus, Ga.

Golden, Mrs. J. P., Columbus, Ga.

A CONFAB BETWEEN CALEY AND SMITH.

Golden, Miss Mamie, Columbus, Ga.

Golden, Miss Sara, Columbus, Ga.

Googins, C. E., Smooth-On Mfg. Co., Jersey City.

Gorman, J. W., Ridgeway Machine & Tool Co., Ridgeway, Pa.

Gow, John, General Electric Co., Schenectady, N. Y.

Graham, W. M., N. Y. Green Fuel Economizer Co., Matteawan, N. Y.

Griffiths, Geo. H., *The Iron Trade Review*, Chicago.

Grunau, W. F., Erie City Iron Works, Erie, Pa.

Gunn, John K., Utica Pipe Fdy. Co., Utica, N. Y.
Hamilton, Wm., Newport News S. B. & D. D. Co., Newport News, Va.
Hazeltine, Reginald, Magee Furnace Co., Boston.
Hessler, Geo. J., Syracuse Fdy. Co., Syracuse, N. Y.
Hill, J., The Hill & Griffith Co., Cincinnati.
Hirschheimer, L. C., La Crosse Plow Co., La Crosse, Wis.
Hockley, Rupert R., Abendroth Bros., Port Chester, N. Y.
Hockley, Mrs., Port Chester, N. Y.
Hodges, C. E., Utica Heater Co., Utica, N. Y.
Hooper, G. K., Con. Engineer, New York.
Hubbard, Geo. A., Chicago Flour Co., Chicago.
Hudson, J. M., president Piqua Flour Co., Piqua, O.
Hutton, C. E., Watt Mining Car Wheel Co., Barnesville, O.
Hutton, W. W., Advance Thresher Co., Battle Creek, Mich.
Jacobs, F. D., The Osborn Mfg. Co., Cleveland.
Johnston, S. T., The S. Obermayer Co., Chicago.
Jones, D., Barnett Foundry Co., Newark, N. J.
Jones, J. E., M. H. Treadwell Co., New York.
Jones, W. A., W. A. Jones Fdy. & Mach. Co., Chicago.
Juliem, J. Henry, J. W. Paxson Co., Philadelphia.
Kanavel, N. E., Interstate Sand Co., Cleveland.
Kaye, Ellsworth, J. S. McCormick Co., Pittsburg.
Keegan, J., United Eng. Foundry Co., Pittsburg.
Keegan, Mrs. J., Pittsburg.
Keep, W. J., Supt. Michigan Stove Co., Detroit.
Kelly, T. P., T. P. Kelly & Co., New York.
Kemp, Simon, Molding Sand Dealer, Catasauqua, Pa.
King, F. W., Corrugated Grinding Wheel Co., Philadelphia.
Knapp, L., Stiles Foundry & Supply Co., Parkersburg, W. Va.
Knapp, Mrs. L., Parkersburg, W. Va.
Knoeppel, John C., Oswego, N. Y.
Knoeppel, Mrs. John C., Oswego, N. Y.
Knoeppel, Frank W., Oswego, N. Y.
Lafever, M., Advance Thresher Co., Battle Creek, Mich.
Lambert, Edw. J., Syracuse Chilled Plow Co., Syracuse, N. Y.
Lambert, Mrs. Edw. J., Syracuse, N. Y.
Lane, H. M., editor *The Foundry*, Cleveland.
Langdon, Palmer H., *The Metal Industry*, New York.
Lent, Thos. K., Wm. M. Crane Co., Peekskill, N. Y.
Lincoln, Geo. H., Geo. H. Lincoln & Co., Boston.
Lincoln, T. M., Hartford Foundry Corp, Hartford, Conn.
Lindsay, E. C., W. W. Lindsay & Co., Philadelphia.
Logan, J. A., Jones & Laughlin Steel Co., Pittsburg.
Lord, Henry F., Lord & Burnham Co., Irvington-on-Hudson.
Loudon, Arch. M., Elmira Heater Co., Elmira, N. Y.
Loudon, Mrs. Arch. M., Elmira, N. Y.
Lyon, E. J., Brown & Sharpe Mfg. Co., Providence.
McCardell, Andrew, Pond Machine & Tool Co., Plainfield, N. J.
McCartney, J. T., Watt Mining Car Wheel Co., Barnesville, O.
McCaslin, H. J., Wellman-Seaver-Morgan Co., Cleveland.
McClintock, H. E., National Founders' Association, Detroit.
McCormick, J. S., J. S. McCormick Co., Pittsburg.
McFadden, W. H., Mackintosh, Hemphill & Co., Pittsburg.
McKenna, Chas. J., New York.
McLaren, John, Phillips & McLaren, Pittsburg.
McLean, E., Penn. R. R., Altoona, Pa.
McLean, Martha, Altoona, Pa.
McLeod, Robt., Newark, N. J.
McNeal, G., Garden City Sand Co., Chicago.
McPhee, H., Eaton, Cole & Burnham Co., Bridgeport, Conn.

E. A. MUMFORD.

McPhee, L., Eaton, Cole & Burnham Co., Bridgeport, Conn.
McPhee, N. H., Eaton, Cole & Burnham Co., Bridgeport, Conn.
McPhee, Mrs. Bess, Bridgeport, Conn.
McQuillin, W. S., Colonial Fdy. & Machinery Co., So. Norwalk, Conn.
MacDougalt, D., National Meter Co., New York.
Maher, Edw., Maher & Flockhart, Newark, N. J.
Malone, T. E., J. S. McCormick Co., Pittsburg.
Marceau, L. E., Abendroth Bros., Port Chester, N. Y.
Marceau, Mrs. E., Port Chester, N. Y.
Martin, Geo. H., Rand Drill Co., Ossining, N. Y.
Matthews, C. D., Camden Iron Works, Camden, N. J.
Meeker, David M., Meeker Foundry Co., Newark, N. J.
Meighan, John A., John A. Meighan, Pittsburg.
Meighan, Mrs. John A., Pittsburg.
Miller, A. J., Whitehead Brass Co., Providence.
Millett, E., Millett Core Oven Co., Springfield, Mass.
Mills, C. E., C. E. Mills Oil Co., Syracuse, N. Y.
Mills, J. F., Abendroth Bros., Port Chester, N. Y.
Mills, Mrs. J. F., Port Chester, N. Y.
Moldenke, Dr. R., secretary American Foundrymen's Association, Watchung, N. J.
Moldenke, Mrs. K., Watchung, N. J.
Morehouse, W. S., A. S. Cameron Steam Pump Works, New York.
Morse, H. R., The W. W. Sly Mfg. Co., Cleveland.
Mumford, E. A., E. A Mumford Co, Philadelphia.
Murphy, Hallet M., Eaton, Cole & Burnham Co., Bridgeport, Conn.
Nanert, Herman, Ridgeway Dynamo & E. Co., Ridgeway, Pa.
Newcomb, F. F., Crocker Bros., New York.
Nicol, Jas., Iron & Brass Works, Sandy Hill, N. J.
Norton, Jas. H., The Burr & Houston Co., Brooklyn.
Overton, C. J., The Winkle Co., Hartford, Conn.
Pangborn, John C., Thos. W. Pangborn Co., New York.
Pangborn, Thos. W., Thos W. Pangborn Co., New York.
Parry, W. H., National Meter Co., Brooklyn.
Pennewill, E. E., Abram Cox Stove Co., Philadelphia.
Perrine, W. A., Abram Cox Stove Co., Philadelphia.
Perry, Walter, Farrell Foundry & Machine Co., Ansonia, Conn.
Pettinos, Chas. E., Pettinos Bros., Bethlehem, Pa.
Pettinos, Geo. A., Pettinos Bros., Bethlehem, Pa.

Pridmore, Henry E., Henry E. Pridmore, Chicago.
Quinn, Hugh T., Eaton, Cole & Burnham Co., Bridgeport, Conn.
Raucherberg, E. C., Wheeling Mold & Foundry Co., Wheeling, W. Va.
Reardon, W. J., Westinghouse Foundry, Pittsburg.
Reese, John, Falls Rivet & Machine Co., Cuyahoga Falls, O.
Reid, David, Canadian Westinghouse Co., Hamilton, Can.
Rider, I. G., Frick Co., Waynesboro, Pa.
Rider, Mrs. I. G., Waynesboro, Pa.
Robeson, J. S., American Glutrose Co., Camden, N. J.
Roedell, W. A., Kennedy Valve Mfg. Co, Coxsackie, N. Y.
Savage, Wm. F., Smith & Anthony Co., Boston.

J. J. BURGER.

Sayles, N. W., American Brake Shoe & Fdy. Co., Mahwah, N. J.
Scuade, G. C., Braddock Machine Mfg. Co., Pittsburg.
Schaffer, J. H., National Corundum Wheel Co., Buffalo.
Schilling, Jos., Russell & Erwin Mfg. Co., New Britain, Conn.
Scholl, Geo. P., *The Metal Industry*, New York.
Schroeter, J. A., Western Foundry Co., Chicago.
Schwerin, C. M., Milwaukee Coke & Gas Co., Milwaukee.

AFTER A HOT DISCUSSION AT ONE OF THE SESSIONS.

Sherman, Wm. J., Bethlehem Steel Co., Bethlehem, Pa.
Sickels, W. H., A. A. Griffing Co., Jersey City, N. J.
Sleeth, S. D., Westinghouse Air Brake Co., Pittsburg.
Slocum, A. W., National Corundum Wheel Co., Pittsburg.
Sly, W. W., The W. W. Sly Mfg. Co., Cleveland.
Smith, Eugene W., Crane Co., Chicago.
Smith, F., Nelson Valve Co., Philadelphia.
Smith, J. S., J. D. Smith Foundry Supply Co., Cleveland.
Smith, M. Sheldon, Globe Foundry Co., Port Chester, N. Y.
Smith, P. C., Ingersoll-Sergeant Co., Easton, Pa.
Spence, David, Greenlee Foundry Co., Chicago.
Stafford, Wm. H., Gibby Foundry Co., E. Boston, Mass.
Stearns, Geo. H., Walker & Pratt Mfg. Co., Boston.
Steele, W. O., Bateman Mfg. Co., Grenloch, N. J.
Stehman, John V. R., Birdsboro Fdy. & Mach. Co., Birdsboro, Pa.
Stehman, Mrs. J. V. R., Birdsboro, Pa.
Stickle, F. W., Manufacturers' Foundry Co., Waterbury, Conn.
Stickle, Mrs. F. W., Waterbury, Conn.
Stone, H. H., Penn. R. R., Altoona, Pa.
Stutz, E., Goldschmidt Thermit Co., New York.
Tabor, Harris, Tabor Mfg. Co., Philadelphia.
Taggart, Edw. M., J. W. Paxson Co., Philadelphia.
Tatlock, W. L., Rand Drill Co., New York.
Taylor, Ellsworth M., Library Bureau, Boston.
Taylor, J. A., Port Chester, N. Y.

W. A. RODDELL.

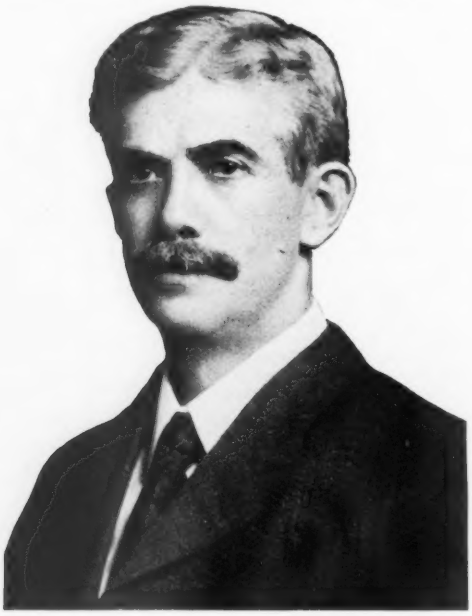
Thomann, Chas., Crosby Steam Gauge Co., Boston.
Thomas, Chas. H., Associated Fdy. Foremen, New York.
Thomas, D. J., Sterit-Thomas Foundry Co., Pittsburg.
Thompkins, S. D., Smooth-On Mfg. Co., Jersey City, N. J.
Thompkins, Vreeland, Smooth-On Mfg. Co., Jersey City, N. J.
Thompson, A. M., Link Belt Machinery Co., Chicago.
Thompson, Mrs. A. M., Chicago.
Thompson, Frank, T. P. Kelly & Co., New York.
Touceda, Enrique, Albany, N. Y.
Trimble, F. W., Whiting Foundry Equipment Co., New York.
Turnbull, R. E., Henry E. Pridmore, Chicago.
Turney, Jas., H. B. Smith Co., Westfield, Mass.
Tutein, E. A., Crocker Bros., Boston.
Vanatta, H., J. L. Mott Iron Works, New York.
Vanderford, Asa, Crescent Iron Works, Springfield, Mo.
Wadsworth, Geo. H., Falls Rivet & Machine Co., Cuyahoga Falls, O.
Waldorf, Henry J., Eaton, Cole & Burnham Co., Bridgeport, Conn.
Waldron, M. D., Utica Heater Co., Utica, N. Y.
Waldron, Mrs. M. D., Utica, N. Y.
Waldron, Miss L., Utica, N. Y.
Walker, Arthur W., Walker & Pratt Mfg. Co., Boston.
Walker, Geo. B., Whitehead Bros. Co., New York.
Walker, Mrs. J. W., New York.
Warren, D. C., *The Foundry*, New York.
Watt, Stewart, Watt Mining Car Wheel Co., Barnesville, O.
Webb, Jas. F., Lake Shore R. R. Co., Elkhart, Ind.
Webb, Mrs. J. F., Elkhart, Ind.
Weeks, A. B., Cambria Steel Co., Johnstown, Pa.
Weeks, S. C., Lorain Steel Co., Johnstown, Pa.

West, Thos. D., Thos. D. West Fdy. Co., Sharpsville, Pa.
Wilke, F. A., General Electric Co., Schenectady, N. Y.
William, A. T., Enterprise Mfg. Co., Philadelphia.
William, Mrs. A. T., Philadelphia.
Williams, Sidney M., A. & B. Brown Co., Elizabeth, N. Y.
Winlock, J. P., Barbour-Stockwell Co., Cambridge, Mass.
Wolff, Chris. J., L. Wolff Mfg. Co., Chicago.
Young, Jas., Penna. R. R. Co., Altoona, Pa.

Convention Notes.

The J. S. McCormick Co., of Pittsburg, published a very neat souvenir program of the convention, containing half tones made from the photographs taken at each one of the meetings, from the Philadelphia meeting in 1896 to the Indianapolis meeting of 1904. The half tones are remarkably good, so that the people can be recognized.

The Green Fuel Economizer Co., of Matteawan, N. Y., presented the members with a



A. L. HOTT, INTERSTATE FOUNDRY CO., CLEVELAND, VICE PRESIDENT A. F. F.

very neat card case, containing a memorandum book in one of the pockets.

The Thos. W. Pangborn Co. presented each one of the members with a very neat match safe, with the compliments of the National Corundum Wheel Co., of Buffalo, N. Y., for whom the Thos. W. Pangborn Co. are Eastern sales agents.

The J. W. Paxson Co., of Philadelphia, are not as slow as their souvenir might indicate. The souvenir referred to is an exceedingly neat little cast iron turtle, having attached to his back a sheet of celluloid upon which it is stated: "It is now fifty years since we first learned to crawl. The J. W. Paxson Co."

The Springfield Facing Co., of Springfield, Mass., gave away an aluminum letter opener of very neat design.

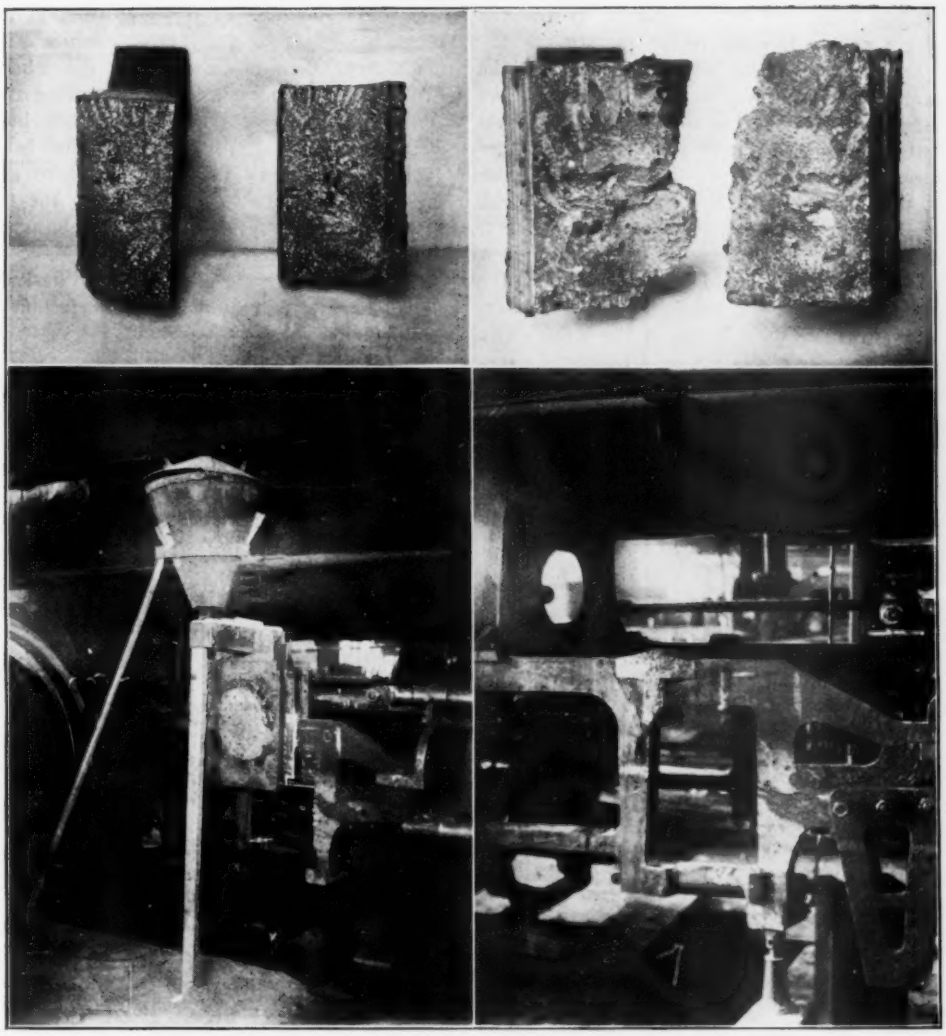
THE USE OF THERMIT IN A RAILROAD SHOP.*

BY JAS. F. WEBB, OF ELKHART, IND.

Thermit is quite new to the majority of us. The first the writer heard of it was about a year ago and since that time he has made a study of it and below is given the experience he has had with it in making several repairs in railroad work. Mr. Autz, general foreman of the Lake Shore railway shop at Elkhart, Ind., has been making some experiments with thermit and the writer assisted him.

The first test was a draw bar of wrought iron, the piece being 2½ x 4¾ in. It was cut in two and welded. We used an ordinary iron flask with openings cut in the sides to let the bar stick out. The size of the flask was 14 x 18 inches, both cope and drag being 8 in. deep. For the sand mixture we used 50 percent fire clay and 50 percent common builder's sand wet with water. The mold was well vented so as to allow it to dry easily. It was dried in a furnace used to melt brass. By placing the mold on top with the bottom side down at first and leaving it over night. The next day the furnace was fired up once more, the mold turned face down and brought to a red heat. The bar was cleaned for four or five inches each side of the break so as to remove the rust. It was then heated to a cherry red and placed in the mold, which was almost red hot. After closing the mold, all small cracks were well filled with soft fire clay so as to prevent run outs. A collar was cast around the break about ⅝ in. thick and 1¾ in. wide, the object of the collar being to give the metal an opportunity to run around the bar so as to melt the surface of it, thus forming a perfect weld. If it were not for the collar, the ends of the bar would not be sufficiently heated. The mold was gated from the bottom, so that the metal would strike the bottom corner of the bar first, run through under it and gradu-

*Read at A. F. A. Conventi n.



1 AND 2 FRACTURE OF THERMIT WELDS, 3 CRUCIBLE IN PLACE FOR A WELD, 4 THERMIT WELD.

ally rise on all sides at the same time. The gate was at an angle of about 15 degrees. The riser was quite large, being 6 x 9 in. at the top and tapering to 2 x 4 in. at the casting or weld. We used a skim gate to catch the slag, as there is about three times as much slag as iron when measured by volume. The slag also is not as liquid as the iron. The skim gate connected from the pouring gate to the riser. We all know that if such practice as this were discovered in a gray iron foundry the molder guilty of it would be looking for a new job soon. The connection between the pouring gate and the riser which forms the skim gate was about 2½ in. from the top of the casting or weld, the opening being 1¾ x 1¾. The writer has found it good practice in this class of work to have a skim gate extend almost up to the top of the pouring gate and riser so as to avoid any tendency of the slag to pass down into the mold.

In this first weld we used 16 lb. of thermit, the collar and the space between the weld together requiring about 22 cu. in. of metal. After breaking the piece, it was found to be full of blow holes so that it broke easily under the screw press operated by hand. In this case the thermit was put in a crucible in the usual way, the ignition powder being placed on top and the metal being tapped as soon as the reaction ceased, which the writer thinks is not good practice. Better results are obtained by

waiting from five to ten seconds, to give the slag a chance to come to the surface.

On the second test, which was made on the same sized bar and in the same way, we used 20 lb. of thermit and got a great deal better weld, with a very good grain and fracture. There were, however, a few blow holes at the top and near the center of the weld, as shown in the half tone reproduction Fig. 1, which is a cross section of the bar after it was broken at the weld. These bars had the collars machined off, together with the riser, so as to make them break at the weld. The second test piece was put on a hydraulic press and required 50 tons to break it, with supports 20 in. apart. The fracture was nearly straight across. In the second test the metal tapped itself about the time the reaction ceased, the reason being that the metal disc used in stopping the bottom of the mold is a little convex on one side and had been placed with the convex side down so that it did not have a perfect bearing. In the later tests we found it best to put the concave side down and thus avoid the trouble.

In test number three we used the same sand and the same treatment, only we used 35 lb. of thermit and 3½ pounds of ¼-in. iron rod, cut into pieces about 8 in. long so that they can be pushed into the thermit for their entire length, previous to igniting the charge. If the bar projects above the surface of the thermit a portion of the metal will not be melted. The amount of iron used in this case was about 10 percent of the thermit used. By using the iron more metal can be obtained from a given weight of thermit charged. Also, as the bars we were experimenting with were of wrought iron, we felt that the use of the wrought iron stock would produce a metal more nearly approaching the wrought iron. This third test was tapped just as the reaction was over. When machining off the collar we found that the metal was not hard, but was exceedingly tough. In machining off the top and one side we found some blow holes, but not to any serious extent. When tested upon supports 20 in. apart it took 50 tons' pressure to break the bar and the fracture was very good, as shown in Fig. 2. The fracture, however, was somewhat more uneven than the one shown in Fig. 1.

After our success with these tests, Mr. Autz decided to try a locomotive frame. The frame first operated upon was broken in the front pedestal over the driving wheels, as shown in Figs. 3 and 4. The break was a vertical one and the frame was of wrought iron, at this point being 3¾ x 5 in. cross section. The machinery taken down included the wheels, driving boxes, shoes, wedges, connecting rods and running board. Five-eighth inch holes were drilled vertically through the break about 1⅛ in. apart, the object being to give the metal a chance to flow up along the line of the crack and result in a solid weld across the entire surface.

The mold was made in a sheet iron flask designed by Mr. Autz, and was a perfect fit in

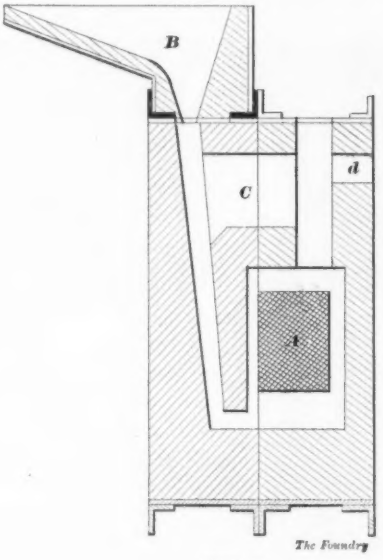


FIG. 5

every respect. The openings about the frame were cut about ¼ in. larger so as to allow some space for adjustment which could be filled later with fire clay. The accompanying sketch, Fig. 5, shows a cross section of the mold through the gate and riser, while Fig. 3 shows the crucible in place ready for ignition and Fig. 4 the weld after the crucible was removed and the gates cut off. In order to avoid the use of the matches and ignition powders in firing the charge, Mr. Autz conceived the idea of firing the charge by electricity, and the wires connected for doing this are shown in Fig. 3. This method of firing proved to be very successful, and it is certainly more convenient and safer than the lighting of the powder by hand. We used 60 lb. of thermit and 6 lb. of ¼-in. wrought iron rods. The charge was tapped from five to seven seconds after the reaction ceased. Owing to the position of the break it was necessary to build a runner 15 in. long to carry the metal from the crucible to the gate. A special crucible

with one flat side might be made for such jobs as this and would probably be found advantageous.

The weld looked very good from the outside, though there were a few small holes on the top, some of which were 1¼ in. deep. The engine, No. 5024, went into service April 20, hauling heavy freight and fast passenger trains, and up to the present time has given A1 satisfaction.

NOTES ON SOME RETORT COKE MELTING RATIOS.*

BY C. M. SCHWERIN, MILWAUKEE, WIS.

During the writer's experience as demonstrator for one of the by-product coke companies, it has been his good fortune to have charge of cupolas of many various styles, melting iron for all classes of work, and as the question of melting ratio is of interest to foundrymen, the results of some tests are here given.

By-product coke is coming so rapidly to the fore and is replacing beehive coke to such a marked degree, that foundrymen all over the country, even when out of the district supplied by the present by-product companies, no doubt are interested.

Many statements have appeared in books and journals of the amount of iron that coke would melt, but the exact melting ratios under ordinary working conditions of the foundries have been very hard to obtain, as a melting ratio for proper foundry operation is not what the coke will do when driven to the limit, but is that ratio at which the coke will give hot, fluid iron adapted to the work being poured. Many foundrymen will tell of some excellent work which they have done at some past time, or will tell about a high ratio which upon close investigation proves to be erroneous, as in many cases the bed has been left out of the calculation, in others a certain number of pounds has been estimated to make up a bushel, and while again some simply take the cupola record as turned into the office without verifying the actual weights—an extra shovel or fork full for good luck, that many cupola tenders are prone to throw in, without recording, exerts quite an influence on the amount of coke consumed.

In this brief article the aim will be to give some exact figures of a number of heats which were run under the writer's supervision. All weights of both coke and iron were actual scale weights with no allowances of any kind.

It must be borne in mind that in every instance the cupolas used were in shops unfamiliar to the demonstrator, and were never, in any instance, in his charge more than three days. In some cases better ratios could have been obtained by carrying on the tests further, gradually reducing the quantity of coke until the limit of safety was reached.

It is my firm belief that coke is one of the most expensive things to economize on that there is about a foundry. It is very poor policy to make an apparently fine ratio without taking into consideration the percentage of bad castings due to poor iron. It is always good practice to use an excess of coke, as saving at "the spiggot and losing at the bung hole" does not increase profits. It pays to have hot iron for many reasons; firstly, it cuts off the molders favorite excuse for bad castings; secondly, it enables small gates to be used on light work, giving clean castings and an easily detached gate and a smaller proportion of remelt; thirdly, iron is more easily skimmed when pouring and slag kept back; fourthly, if a slight accident happens, such as the power shutting down, etc., there is a margin of safety to work with.

Another thing to be borne in mind when comparing ratios, in addition to the thinness of castings to be poured, is the chemical composition of the metal. High phosphorus, high carbon or high silicon iron will stay fluid much longer than low phosphorus, low carbon and low silicon iron. High sulphur in coke will make an iron set quickly even though it comes hot from the cupola. Doubtless many of the readers of this article will recall some experience of two years ago during the coke famine that will bring this fact home to them.

The so-called "semi-steel" mixtures which are simply low silicon, low carbon cast irons high in manganese, set very quickly, as every man who has ever had to keep ladles in repair in a foundry pouring this metal will testify to. The proportion of scrap to pig iron and the size of both affect both melting ratio and speed of melting, and both are constantly varying. This is another reason for keeping on the safe side in regard to the quantity of coke used.

Most of the heats here recorded are really too small to show the best total ratio as the bed enters in as too prominent a factor, but the figures are representative of the majority of the shops of this country as the big melter is the exception and not the rule.

Our experience has shown that a high coke bed gives better net result than starting with the so oft recommended 18 in. above the top

*Read at A. F. A. Convention.

of the tuyeres. This seems to be a disputed question, however, and the writer would appreciate information in regard to the actual experience of others. By running the bed high less coke by far may be used on the subsequent charges; once the bed burns out and melting commences too near the tuyeres, trouble begins. Many, no doubt, have noticed the rush of slag at the end of a heat, even when no flux has been used; when this happens it is invariably found that melting took place very near the tuyeres, causing the blast to excessively oxidize the iron. Not only is this a disadvantage in regard to the amount of coke used, and trouble with slag, but the iron resulting will be harder than if the melting was done at the proper place, due to the oxidization of silicon, carbon, etc. Those who had the good fortune to witness the tests on coke conducted at the Model Foundry in St. Louis, no doubt saw this point nicely illustrated. The bed in those tests was brought only eight inches above the top of the upper tuyeres; on heats of about 3,000 lb. the oxidization was very heavy and slag just poured in a liquid stream out of the slag hole, and the iron lost in melting was found to be very high indeed. For these tests this method of running was of course all right as comparative data of various cokes under the same conditions was what was sought, and the tests were very painstakingly and carefully conducted under supervision of Dr. Moldenke.

In running a cupola to get the most economical results it is found that the bed should be lighted up as late as possible, and that the blast should be put on as soon as feasible after the cupola is charged full of iron. In burning the bed it is a good plan to put only a portion of the coke on the wood before lighting, and as the flame shows through, the remainder of the coke should be charged. As soon as all the wood is burned out, and the blue flame appears through the top of the bed coke, all tuyeres should be closed and charging of iron begun. Just before putting on the blast, it is advisable to open one tuyere in order to prevent any possibility of a gas explosion, this tuyere to be closed, of course, after the blast has been on a minute or so.

Another point to be considered is the running of a cupola with only one row of tuyeres instead of with two. The cupola with only the lower row will run more economically, as far as coke consumption goes, and less difficulty would be experienced in the burning out of the brick. Of course a cupola with two rows of tuyeres melts somewhat faster with both rows open than if only the lower row be used, but if the lower row be enlarged, the same speed of melting can be obtained as though two rows were used. In an endless number of cases we have found that general economy results through using but one row of tuyeres, and very nearly all the foundries which the writer has visited are now running that way. The coke used in the following tests was from the Solvay by-product ovens at Milwaukee, Wis.

TEST NO. 1.

Inside cupola diameter at doors, 42 in., at tuyeres, 40 in., at melting zone, 41 in.

Tuyere arrangement—

6 tuyeres 10 x 4 in. flaring from 6 x 4 in.

Lower side of tuyeres 14 in. above the sand bottom.

	Pounds Coke	Pounds Iron
Bed charge	1,000	3,000
Charges 2 to 11, inclusive	120	1,500
" 12 " 15, "	100	1,500
Charge 16	80	1,000
Total	2,680	25,000

Ratio of coke to iron, exclusive of bed, 1 to 13.1.

Ratio of coke to iron, inclusive of bed, 1 to 9.3.

Total time blast on, 2 hours and 5 minutes.

Pounds or iron melted per hour, 12,000.

Blast pressure used varied from 9 to 10½ oz.

Mixture used consisted of 45 percent unbroken pig and 55 percent medium weight scrap.

Castings for agricultural machinery and threshing engines were poured.

The iron was considerably hotter than needed.

TEST NO. 2.

The same cupola was used as in test No. 1.

	Pounds Coke	Pounds Iron
Bed Charge	1,000	3,000
Charges 2 to 3, inclusive	150	2,000
" 4 " 11, "	125	2,000
Charge 12	100	1,500
Total	2,400	24,500

Ratio of coke to iron, exclusive of bed, 1 to 15.3.

Ratio of coke to iron, inclusive of bed, 1 to 10.2.

Total time blast on, 2 hours.

Pounds of iron melted per hour, 12,250.

Blast pressure used, varied from 9 to 10½ oz.

Mixture used consisted of 45 percent unbroken pig and 55 percent medium weight scrap.

Castings for agricultural machinery and threshing engines were poured.

The iron was hot enough throughout the entire heat, and for pouring some of the work it was cooled by the molders.

TEST NO. 3.

Inside cupola diameter at doors, 37 in.; at tuyeres, 33 in.; at melting zone, 36 in.

Tuyere arrangement—

4 lower tuyeres, 12 x 3 in., flaring from 6 x 3 in.

4 upper tuyeres, 6 x 1¾ in.

Lower side of lower tuyeres 11 in. above the sand bottom.

Top of the upper tuyeres, 23 in. above the sand bottom.

	Pounds Coke	Pounds Iron
Bed charge	600	1,100
Charges 2 to 8 inclusive	90	1,100
Charge 9	50	700
Total	1,280	9,500

Ratio of coke to iron, exclusive of bed, 1 to 12.3.

Ratio of coke to iron, inclusive of bed, 1 to 7.4.

Total time blast on, 1 hour and 10 minutes.

Pounds of iron melted per hour, 8,140.

Blast pressure was started with 10 oz. but was reduced, as the molders could not carry away the iron fast enough.

Mixture used consisted of 45 percent unbroken pig and 55 percent medium weight scrap.

Light sewing machine castings were poured.

The iron was very hot.

The coke dropped in the bottom from this heat was picked out and found to weigh 240 lb. If this amount be subtracted from the coke used in the heat, the net ratio of coke to iron, inclusive of bed, would be 1 to 9.1.

TEST NO. 4.

Inside cupola diameter at doors, 44 in.; at tuyeres, 41 in.; at melting zone, 42 in.

Tuyere arrangement—

5 tuyeres, 8½ x 5 in.

	Pounds Coke	Pounds Iron
Bed charge	1,005	4,000
Charges 2 to 5, inclusive	240	2,800
Charge 6	240	2,300
" 7	85	1,000
Total	2,390	18,500

Ratio of coke to iron, exclusive of bed, 1 to 11.3.

Ratio of coke to iron, inclusive of bed, 1 to 8 1.

Total time blast on, 1 hour and 50 minutes.

Pounds of iron melted per hour, 10,090.

Blast pressure used, 7 to 8 oz.

Mixture consisted of 70 percent unbroken pig, with 30 percent of quite heavy scrap.

Machinery castings were poured.

The iron was hotter than needed and was cooled down throughout the heat by throwing scrap into the ladles.

TEST NO. 5.

Inside cupola diameter at doors, 34 in.; at tuyeres, 32 in.; at melting zone, 32 in.

Tuyere arrangement—

6 Tuyeres 7½ x 2½.

Lower side of tuyeres 10 in. above sand bottom.

	Pounds Coke	Pounds Iron
Bed charge	610	1,800
Charge 2	160	1,800
" 3 to 6	160	1,800
Charge 7	105	1,600
" 8	35	500
Total	1,550	12,900

160 lb. of old coke dropped in the bottom from the heat the night before was used during above heat, the amount being distributed throughout the charges. This gave 1,390 lb. of new coke used during the heat.

Ratio of new coke to iron, exclusive of bed, 1 to 14.2.

Ratio of new coke to iron, inclusive of bed, 1 to 9.3.

Ratio of total coke to iron, inclusive of bed, 1 to 8.3.

Total time blast on, 1 hour and 8 minutes.

Pounds of iron melted per hour, 8,795.

40 percent scrap and 60 percent of broken pig was used.

Very little agricultural castings were poured.

The iron was very hot.

TEST NO. 6.

Inside cupola diameter at doors, 30 in.; at tuyeres, 33 in.; at melting zone, 31 in.

Tuyere arrangement—

4 Tuyeres 10 x 2½ in. flaring from 6 x 4½ in.

Lower side of tuyeres 15 in. above sand bottom.

	Pounds Coke	Pounds Iron
Bed charge	550	1,100
Charges 2 to 7, inclusive	90	1,100
" 8 " 9* "	80	1,100
Total	1,250	9,900

*Coke on last charge could have been reduced but it was first thought that more than 1,100 lb. of iron was to be put on the last charge; on the heat which was run the previous day only 105 lb. of coke were used on the last charge to melt 1,600 lb. of iron.

Ratio of coke to iron, exclusive of bed, 1 to 14.1.

Ratio of coke to iron, inclusive of bed, 1 to 7.9.

Total time blast on, 1 hour and 30 minutes.

Pounds of iron melted per hour, 6,600.

Blast pressure not determined.

Mixture consisted of 75 percent broken pig and 25 percent scrap.

Castings for furnaces, requiring hot iron, were poured.

Iron was hot.

TEST NO. 7.

Inside cupola diameter at doors, 36 in.; at tuyeres, 38 in.; at melting zone, 39 in.

Tuyere arrangement—

6 Tuyeres 16 x 3½ in. flaring from 8 x 4½ in. The lower side of tuyeres 14 in. above sand bottom.

	Pounds Coke	Pounds Iron
Bed charge	850	3,000
Charge 2	165	2,000
" 3	150	2,000
" 4 to 5, inclusive	125	2,000
" 6	75	1,500
Total	1,490	12,500

Ratio of coke to iron, exclusive of bed, 1 to 14.8.

Ratio of coke to iron, inclusive of bed, 1 to 8.4.

Total time blast on, 1 hour.

Pounds of iron melted per hour, 12,500.

Blast pressure, 10½ oz.

Mixture used, 50 percent pig, 50 percent light scrap.

Castings for railroad and jobbing work poured.

Iron was hot.

No records in any way are claimed for these heats, the figures simply being presented as of interest to foundrymen in general as showing what is actually being done under regular working conditions. These tests themselves show such a wide variation that that fact in itself is of interest in making comparisons, particularly as the quality of the coke used was very uniform. In many cases that have come under the writer's notice, similar cupolas in both size and type would give widely different results even when the same coke was used. These variations were due to a variety of more or less understood causes, which it is not the purpose of this present paper to discuss, but when comparing the records here given with his own practice, each foundryman must bear in mind that conditions vary.

BLOWERS, PIPING AND CUPOLAS AT THE PLANT OF THE MICHIGAN STOVE CO.*

W. J. KEEP, DETROIT, MICH.

In describing this plant and the performance of the cupolas and blower, it is with the full realization that ideal conditions seldom exist, and that each man must fashion according to his needs.

An independent blowing unit for each cupola with short piping, is an arrangement we would like to have, but which only a favored few possess.

In our case, the piping from the blower has been extended to meet the growth and increased demands of our plant. Until now we have three cupolas operated by one blower, under the following conditions: Starting at the blower end is a No. 7½ Roots' blower, running at 150 r. p. m. From there the air piping is carried overhead by two 90-degree bends in a 28-in. line, 72 ft. to a point where it branches with a Y into two 24-in. lines, one running 248 ft. to cupola No. 3; the other 104 ft. to cupola No. 1. From No. 1 with a Y branch begins a 16-in. line running 210 ft. to No. 2 cupola. All bends are long radius and wind boxes are supplied by two pipes on opposite sides, starting from a Y on the main line. The

*Read at A. F. A. Convention.

No.2 Cupola uses 6710 coke.
61550 lbs. of iron.
Time wind on 2 hours 50 min.
Melting ratio 9.17 to 1.
Coke bed 1900 lbs.
Sand bottom to tuyers 12"
Melts 10⅞ tons per hour.

No.2 Cupola 72"outside
5½ inch lining.
Blast pressure 15 oz.

634 feet of pipe in all.
2 - 90° bends in 28"pipe.
3 - 45° " " 24" "
4 - 45° " " 16" "
6 long bends in 12"pipes.
4 Y forks.

Charge for each cupola.
1st charge on coke bed 4800 lbs. iron.
All other charges 3000 " "
All coke charges 260 lbs.
Total iron melted 81 tons 50 lbs.
Melting ratio for the three cupolas 9.02 to 1.

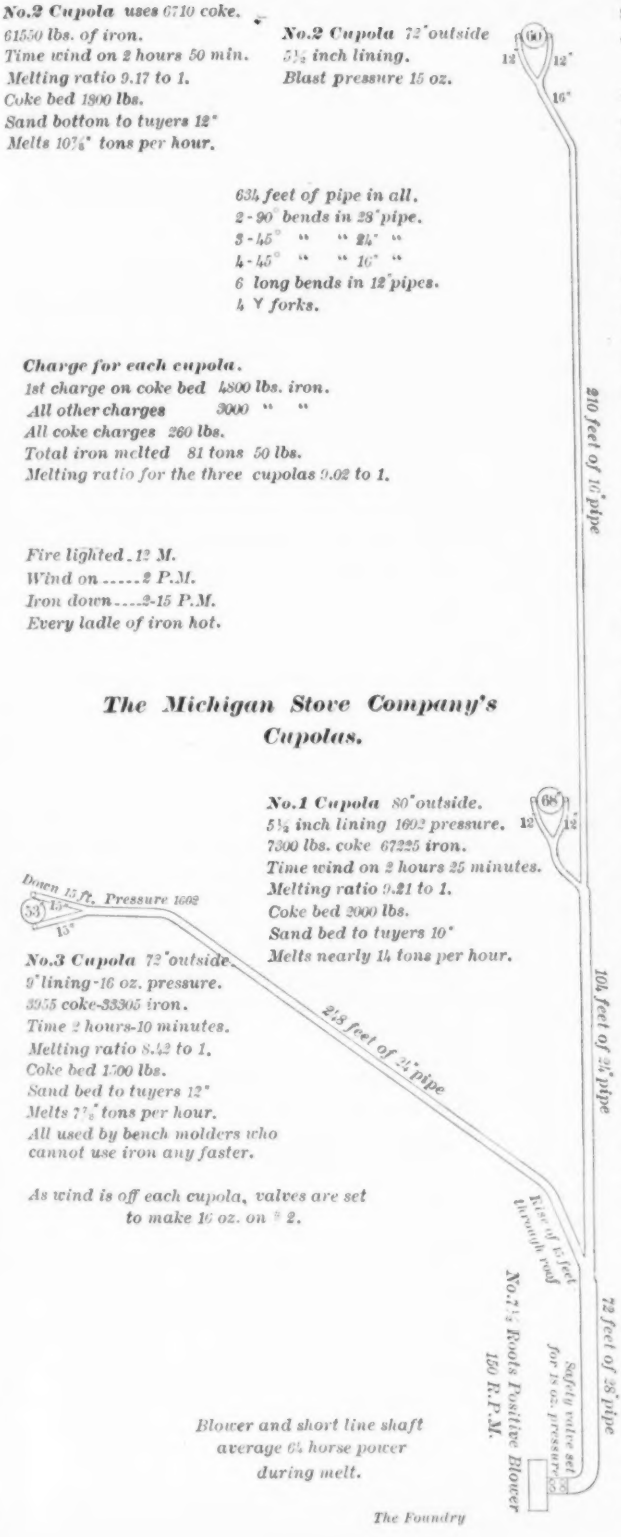
Fire lighted 12 M.
Wind on ..... 2 P.M.
Iron down .... 2-15 P.M.
Every ladle of iron hot.

The Michigan Stove Company's Cupolas.

No.1 Cupola 80"outside.
5½ inch lining 16oz pressure.
7300 lbs. coke 67225 iron.
Time wind on 2 hours 25 minutes.
Melting ratio 9.21 to 1.
Coke bed 2000 lbs.
Sand bed to tuyers 10"
Melts nearly 14 tons per hour.

No.3 Cupola 72"outside.
9"lining-16 oz. pressure.
3955 coke-33305 iron.
Time 2 hours-10 minutes.
Melting ratio 8.42 to 1.
Coke bed 1700 lbs.
Sand bed to tuyers 12"
Melts 7⅞ tons per hour.
All used by bench molders who cannot use iron any faster.

As wind is off each cupola, valves are set to make 16 oz. on No 2.



Blower and short line shaft average 6¼ horse power during melt.

The Foundry

sketch shows the general location of the pipe lines and cupolas.

There are butterfly valves in line at cupolas Nos. 1 and 3, so that cupola No. 2 may not be short of wind, and which are also opened to allow surplus air to escape when cupola No. 2 is operated alone. No. 3 is the point where the least air is needed and is where most of the throttling down occurs, because this cupola serves a snap flask shop, which cannot take care of the iron as fast as the normal operation of the cupola would furnish it.

As No. 3 cupola seldom operates over two hours, and with a very small heat, it is run at a disadvantage and cuts down the average efficiency of the entire plant.

In most of the data the results are for the plant as a whole, and while this shows unfavorably for Nos. 1 and 2, it represents the actual working conditions liable to occur in almost any large plant.

We find that our best results are obtained with a blast pressure at the cupola at from 16 to 18 ounces, for we get our fastest melting under those conditions, without sacrificing economy of operation. In order not to exceed 18 ounces a relief valve is placed at the blower to lift at that pressure. We have tried higher pressures and have found that with from 22 to 26 ounces there was no increase in the melting rate, as the chilling effect of excess air nullified the advantage of increased blast pressure. Up to 22 ounces there was a decided increase of output, but the best results were with a blast of 16 or 18 ounces.

The losses from friction in the piping are ½ ounce to No. 3, ¾ ounce to No. 1 and 1½ ounce to No. 2. At the beginning of the heat only Nos. 1 and 2 are on. Later No. 3 is started up and the pressure falls as low as 14 ounces at No. 2. This condition does not last for more than half an hour, when the pressure runs up to 15

ounces at No. 2 and 16 ounces at Nos. 1 and 3, at the end of the heat, with the dampers, this cupola getting 16½ ounces and melts very fast. The following is the record of an 81-ton heat in the fall of 1904 when the foundry was running to its full capacity:

AN 81-TON HEAT IN 1904.

Cupola	Outside Diameter	Inside Diameter	Coke Used	Iron Melted	Ratio Iron to Coke	Length of Heat	Tons Melted per hour
No. 1	80"	68"	7300	67225	9.21 to 1	2h—25m	14
" 2	72"	60"	6710	61550	9.17 to 1	2h—50m	10⅞
" 3	72"	53"	3955	33305	8.42 to 1	2h—10m	7⅞

Totals, 81 tons 50 lb. iron. 32.75 tons per hour. Ratio 9.2 to 1. Air displaced by blower per ton per hour 22,800 cu. ft.

For stope plate it requires close attention to avoid dull iron when the ratio is above 9 to 1, and the following are average records. When more coke is burned melting is slower:

A 75½-TON HEAT IN FEBRUARY, 1905.

Cupola	Coke Used	Iron Melted	Ratio	Length of Heat
No. 1	6900	63430	9.0 to 1	2h—55m
" 2	6450	59250	9.2 to 1	2h—55m
" 3	3640	28270	7.8 to 1	1h—50m

75 tons 950 lb. iron. Ratio 8.86 to 1. Air 25,380 cu. ft.

1905	March 1	March 2	March 4
Total Coke Used	16950	16970	16660
Total Iron Melted ..	75 tons 10 lbs	74 tons 1740 lbs	73 tons 190 lbs
Ratio Iron to Coke..	8.8 to 1	8.8 to 1	8.7 to 1
Tons Melted per hr	28.8 tons	28.07 tons	28.00 tons
Cu. ft. of Air per Ton per hour.....	25500	26400	26400

On March 8, 1905, on account of a funeral of one of the employes, No. 1 cupola was run alone with an air pressure of 17 ounces.

The molders could not pour fast enough to take the iron as fast as melted and it was therefore necessary to reduce the blast at times. Under these conditions 33 tons 960 lb. of iron were melted at the rate of 13.4 tons per hour with a ratio of 9.2 to 1.

As the average of the last four heats in No. 1 cupola was 11 tons per hour, the increasing of the blast 1½ oz. has increased the melting 20 percent.

HORSEPOWER REQUIRED TO DRIVE THE BLOWER AT VARIOUS PRESSURES.

Pressure at Blower	Indicated Horsepower to drive Blower	Theoretical Horsepower to drive Blower	Per cent Efficiency of Blower	Friction
13 ounces	50 I. H. P.	45.23	90.4	6.9
18 ounces	72 "	62.48	92.0	8.0
23 ounces	87 "	80.00	87.0	13.0

The engine was indicated by an expert. 18 ounces at the blower would produce the normal pressure at each cupola.

The friction of a short countershaft and belt are included in these figures. As the relief valves of our blower are set for 18 ounces and our pressure varies from 13 to 18 ounces, it is fair to assume 64 as the average horsepower consumed during one melt. As the tonnage with three cupolas is 28½, the horsepower per hour required under our conditions is $64 \div 28\frac{1}{2} = 2.25$, and the air displacement per ton of iron per hour is 26,220 cu. ft. per hour, instead of 30,000 cu. ft., as usually allowed.

As a pound of carbon requires about 11 lb. of air for combustion to CO^2 and 13 cu. ft. of air equals 1 lb., therefore 1 lb. of coke should require 143 cu. ft. of air. The coke averages about 5,650, requiring theoretically 28,500 cu. ft. of air per hour.

Wishing to know what the makers would recommend for our work, as the most economical installation, we find, in spite of our long pipes, and air actually wasted, when Nos. 3 and 1 are shut down, that we are still well within what would be ordinarily expected in an ideal arrangement of independent blowers and motors for each cupola, with consequent decrease of pipe friction.

The makers recommended as follows:

Cupola Blown	Cu. Feet Air Displacement per Minute	Horsepower	Tons
No. 1	7000	30.5	14
" 2	5400	23.5	10⅞
" 3	4000	17.5	7⅞
Total.....	16400	71.5	32¾

Allowing 20 percent for friction of blower and motor, we get 90 horsepower, or 2¾ horsepower per ton, against 2¼ actually required.

On the above basis of air the friction losses figure out 1 ounce to No. 1 cupola, 3.1 ounces to No. 3, and 6 ounces to No. 2. On an allowance of 24,000 cu. ft. per hour per ton of iron the friction to No. 1 cupola is .9 ounces, to

No. 3, .55 ounces, and to No. 2 cupola is 2.50 ounces.

The actual loss as stated before is from ½ to ¾ of an ounce to Nos. 1 and 3. It is from 1¼ to 1½ ounces to No. 2, showing that our piping is of correct size to Nos. 1 and 3 but too small to No. 2. It would be better to continue the 28-in. pipe to the fork at No. 1 and make it 20 in. or 24 in. to No. 2.

The data presented here represents as near as possible actual running conditions, and our plant could be improved upon by independent units for each cupola with shorter piping, thus avoiding the waste of air when Nos. 1 and 3 are down. This could be done by reducing the speed of the blower, but as we are fixed we have to use constant speed.

However, as we are now getting iron as hot and as fast as we wish it, there is no object in increasing the blast pressure.

We would be very much interested to have the records from a plant where the arrangement is similar to ours, and where a fan is used instead of a rotary blower.

A MODERN METHOD OF VENTING CORES.*

BY JAS. A. MURPHY, FRANKLIN, PA.

The proper venting of cores has always been a theme upon which foundrymen could base interesting argument. Bad venting has always furnished a ready made excuse for a bad casting by the molder; indeed, when he could think of nothing else to lay the blame on, the core was sure to come in for a bad character and the coremakers' ability was criss-crossed with suitable and expressive adjectives.

Not all molders recognize the degree of skill that is required to vent some crooked cores properly, nor do all coremakers realize how necessary it is to have vents through which the gas will flow easily and without any unnecessary obstruction.

The evolution of the air compressor, gas engine and automobile has set the brightest minds in the business experimenting, seeking a remedy for the poorly vented cores that cause such disturbances at casting time. The proper venting of this class of cores is a far more skillful operation than most people are ready to allow, and it is only seldom that the coremaker has the proper facilities to do the job properly. The core shop is the most neglected part of our foundries today and it is only within a few years that it has been given any notice at all. It is a hopeful sign of the times, however, to see foremen and employers in general waking up to its necessities and its possibilities.

The pulling of wires and soaped strings around corners as a means of venting is a thing of the past. The wax wire method of

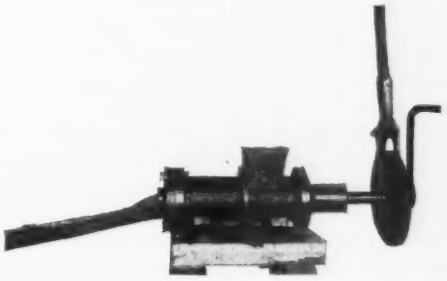


FIG. 1. PRESS WITH WAX WIRES BEING FORCED OUT.

venting has come into our foundries to stay. All methods of wax wire venting are not by any means satisfactory.

The wax taper with a string or threads running through it gives very poor satisfaction, that with the wire through it is better but its cost is an item of no small consideration and many foundries prefer to do without it and continue to lose castings on this account. The object of using the wax, of course, is that the core while drying absorbs the wax, leaving only the string or wire which when pulled out leaves an open and free hole.

If the string gets burned on the end it is a difficult job to pull it and if it breaks inside the core it cannot be extracted. An imperfect vent is the result and a possible blown casting.

The wax wires, Fig. 1, are the result of much experiment to do away with strings of any kind in the wax, in fact, to have something that was as nearly fool-proof as possible.

The element of cost was also a consideration and the composition used is made at less than one-eighth of the cost of any wax on the market today. The illustration of the machine, Fig. 1, gives a fair idea of the process of manufacture. A helper will turn out enough of different sizes to last 30 coremakers one day in about one hour, so the cost of manufacture is infinitesimal, once the installation is made

These wires are easy to handle, are not sticky except when hot, are as tough as twine when at the right temperature, and can be made in coils of any length or cut off in desirable lengths and laid away in trays ready for instant use. There is no waste as the pieces not used, short ends, etc., are again put back

*Read at A. F. A. Convention.

in the machine and pressed out as new wires.

The thickness is regulated by the die. In practice I make them from 3-32 to ⅜ in., but any desired size can be made. The material is very light and I have known men not to use a pound all day venting the most complicated of jacket cores for air cylinders.

The skill of the coremaker is considerably minimized in producing a perfectly vented core, as it is impossible for him to do otherwise if he rams up a string of this wax in the proper parts of the core. It is not claimed that this wax will take the place of rods, but its absorption by the sand in baking has a very decided tendency to strengthen the core.

Several cores that must be made in halves in order to be properly vented can be made in one

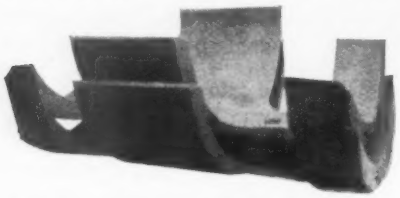


FIG. 2. JACKET CORES VENTED WITH WAX WIRES.

piece by this process at a considerable saving of time and expense.

Since I designed this machine and brought this method of venting cores to what I consider a state of absolute perfection, in the shops of the Chicago Pneumatic Tool Co., at Franklin, Pa., blown cores are a thing unknown in our foundry where every casting is filled with them and where work of the most intricate character is the rule rather than the exception.

I cannot lay too much stress on the time saving qualities of this machine. Venting is at best a tedious and time-killing operation no matter how it is done, but with this wax all that is necessary is to ram up the string in the proper place and the job is done permanently and well.

The ingenuity of the most expert designer in producing crooked orifices for which cores must be employed in the production of the casting, is defied, for as long as there is left any opening through which a small pipe can be passed a perfectly vented core can be made by this process.

Several foundrymen who have seen the process in operation have pronounced it one of the most important of inventions for the cheap and safe production of intricate work.

Its cost of installation being very small, the cost of the material not worth mentioning, no waste material, the accessibility of all sizes of strings in any quantity at a moment's notice and the perfection of the cores that it is used in, are all points very much in its favor of being later as universally adopted as the core making machine.

FIG. 3. CYLINDERS AND CORES.

NOTE—The protograph reduces the cores more than the cylinder. The vent is all taken off trough x x.

I consider it an absolute indispensability in shops which make a specialty of pump, engine, air compressor, gas engine, automobile or other intricate or delicate work. In several of these shops its savings in the course of a year would run well into the thousands of dollars.

TRADE PUBLIICATONS.

The Canadian Engineer, published at Toronto, beginning with the issue of June 1, 1905, will be issued under new auspices; both as regards ownership and the editing of its columns. The paper is now owned by the Monetary Times Printing Co., which also publishes several other trade papers. Biggar-Samuel, Ltd., were the former publishers. Under the new regime Thomas Robertson will be president, James Hedley, vice president, and Edgar A. Wills, secretary and treasurer. Samuel Groves will be editor. He is an expert in metallurgical science and was 1904 lecturer on "Mines, Furnace and Foundry," to the Carnegie Technical Schools, Pittsburg.

The National Electric Co., Milwaukee, Wis., have started a series of publications which they call "An Electrical Catechism." These are neatly printed little leaflets, 5 by 6½ inches, in which they give various electrical definitions and matter of interest to any one working along electrical lines. The leaflets are so gotten out that they can afterwards be placed in a suitable binder.

The F. W. Greene Co., of Mechanicsville, N. Y., has issued a catalogue showing an extensive line of stove trimmings manufactured by this company, including plans for stoves for both gas and solid fuel.

The McConway & Torley Co., of Pittsburg, Pa., have gotten out a very neat publication entitled "The Evolution of Car Couplings." It is a well illustrated booklet 9½ by 12 inches, which contains diagrams and illustrations of the various forms of car couplers which have been brought out from time to time, showing the gradual advance from the previous form to the more recent. The book is published in both English and French, there being two columns on each left hand page, one telling the story in English and the other in French. The right hand pages are taken up with the illustrations, diagrams, etc.

W. W. Lindsay & Co., of Philadelphia, are sending out a very neat little catalogue, 3¼ in. x 6¼ in., in which they describe the foundry chaplets and anchors which they manufacture. These devices are fully illustrated and tables of dimensions and prices given.

The Ansonia Brass & Cooper Co., with head offices at 99 John street, New York, is sending out a catalogue, 4 in. x 7¼ in., describing and illustrating the various uses of tobin bronze. The second page contains an illustration of the mills of the Ansonia Brass & Copper Co., at Ansonia, Conn. Following this there are several pages of what the company furnishes, what the material is suited for, what tobin bronze is, including its physical tests, instructions for ordering the same and much other information which should be of use and interest to all requiring such special metals.

The Ingersoll-Sergeant Drill Co., of New York, is sending out a book entitled "The Blue Book of Air Compressors." It contains a list of their offices, next a general introduction or statement concerning the company and the book, after this a view of its works at Easton, Pa., and Phillipsburg, N. J. This is followed by illustrations and short descriptions of its various classes of compressors. These statements describe the machine in a few words and then state the classes of work for which it is especially adapted. The last few pages of the book mention the other classes of machinery the company makes, including rock drills, quarrying machinery, pneumatic tools, etc.

The Crocker-Wheeler Co., Ampere, N. J., has issued a publication entitled Bulletin No. 52, describing its large electric generators which are used largely for railroad work.

The Williamsburg Heating & Foundry Co., of Williamsburg, W. Va., has issued a catalogue describing its X L O P warm air furnaces. Each part of the furnace is illustrated in detail and its working fully described.

The Chicago Pneumatic Tool Co. has issued a catalogue of new pattern type "G" Franklin Compressors. They are made steam belt or motor driven.

The Ingersoll-Sergeant Drill Co., of New York City, has issued a bulletin entitled "Track Laying on the Williamsburg Bridge" in which it illustrates the use of its pneumatic tools for various classes of work in connection with the laying of the track on the bridge mentioned.

The C. E. Mills Oil Co., Syracuse, N. Y., has issued a little catalogue entitled "The Selection of a Core Compound," in which is given a short statement of the expenses showing the comparative expenses of different compounds. This is followed by several pages of users of their compound and then a statement as to the kind of products which the company furnishes.

Manual for Engineers. Published by the University of Tennessee, Knoxville, Tenn. Price, $.50. This is a small vest pocket manual gotten up by Prof. Charles E. Ferris. The original object of the book was to interest men of the South in education. It contains first a preface stating its object, and next a list of the Faculty of the University of Tennessee. Following this there is a short description of the University, fees charged, classes taught, etc. This is followed by 147 pages of tables and useful information such as would be handy in engineering work. This includes areas and circumferences of circles, squares, cubes, logarithms, and many useful tables covering material used in engineering construction. The book is of interest to any one engaged in engineering work. The last of the book contains advertisements of various engineering firms, and there is also a very well-gotten up index covering the subject matter of the volume.

The directors of the Utica Pipe Foundry Co., at a meeting May 12, adopted resolutions on the death of Henry W. Miller, former president of the company. He was one of the founders and incorporators of the company. To his wise council, careful guidance and unflagging energy, much of its success is due.

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TRADE OUTLOOK.

There have been no especial developments in the foundry field since our last issue. Southern iron shows some weakness and $11.75 Birmingham for No. 2 foundry is the ruling price. Some furnaces, however, still ask $12 per ton, while, on the other hand, a few sales have been made at $11.50 per ton. None of these quotations, however, have induced large buying. The Northern pig iron market continues somewhat stronger than the Southern and many furnaces will not sell No. 2 foundry at less than $15 per ton Valley, although some parties would probably shade the price slightly. There has been considerable inquiry lately for all grades of pig iron, showing an increased interest in the market and indicating that there will probably be considerable buying during July. Reports from foundries indicate that they are melting all their iron about as fast as it is delivered, and an occasional rush order reveals the fact that some only have small stocks on hand.

The steel foundries throughout the country all continue very busy and most of the malleable foundries are exceedingly busy. The gray iron foundries as a rule are not working to their full capacity. An explanation of this condition probably lies in part in the fact that the steel foundries have taken from the malleable men a large tonnage, especially in railroad work. To make good their loss the malleable men have succeeded in inducing many manufacturers to use small malleable castings, where formerly gray iron was employed. This is especially true in the stove trade. This means that the side floors of many jobbing foundries are short of work, while the heavy floors are crowded. The preponderance of heavy work in the gray iron foundries keeps up the melt to quite a high figure, so that the tonnage from these plants no longer bears the same relation to the number of employes that it did formerly.

After all is said, however, a careful canvass of the field shows that the foundry interests of the country are only moderately busy, with comparatively few large contracts ahead. It is to be hoped that the present conditions will continue without any tendency toward abnormally high prices for supplies on the one hand, or excessive demands for increases in pay on the other. With the foundry business in its present condition, some foundries can actually buy their castings as cheaply as they can produce them themselves, and keep their

plants going simply to hold their working force together.

When there are plants in the country which are in this condition, it is no time for an increase in either the cost of material or labor unless accompanied by an increase in the price received for the output.

NEW OFFICERS OF THE A. F. A. AND A. F. F.

In this issue we publish photographs of some of the new officers of the A. F. A. and A. F. F., but the photographs of some could not be obtained in time for publication.

THOMAS D. WEST, PRESIDENT OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION.

NEW BOOKS.

American Tool Making and Interchangeable Manufacturing, by Joseph B. Woodworth, published by the Norman W. Henley Publishing Co., price $4.00. The author of this work has been well known to all connected with American manufactories, as he has written extensively for the technical press. He has now gone back over the many articles he has written, carefully rearranged the matter, and put it forth in a volume of 560 pages, which contains 600 illustrations. As the name implies, the work is intended as a guide for toolmakers and those interested in the making of machinery for manufacturing duplicate parts. A large number of devices are described and very fully illustrated. This work fills a long-felt want in our mechanical literature, and will be found of great value not only to the patternmaker, but to all interested in the class of manufacturing work. There are many things in the work which would be of great interest to metal patternmakers, though the work was not written primarily for their guidance.

DR. RICHARD MOLDENKE, SECRETARY AMERICAN FOUNDRYMEN'S ASSOCIATION.

Tools for Engineers and Woodworkers, by Joseph Horner, price nine shillings, net. Published by Crosby, Lockwood & Sons. This work might be called an encyclopædia of tools and devices used in manufacturing. It contains tools for both wood and metal working, together with illustrations of the same, and a comparison of the tools used for different classes of work. In many cases a careful reading of this book would enable a workman to select tools more nearly adapted to the work in hand. The book contains 340 pages, and over 450 illustrations. Considerable space is given to the subject of measuring instruments and devices. The work does not treat of machine tools at all, but simply of hand tools or cutters used in machine tools and their application.

Mechanical Drawing, by Charles W. MacCord. Published by John Wiley & Sons, price $4.00. This is a large book comprising two parts, the first containing 145 pages, and the other 97 pages. In the first part the author treats of mechanical drawing in general, starting with the simplest problem and giving a series of exercises illustrating each class of work. He starts out with a significant statement that mechanical drawing and geometrical drawing are by some writers used synony-

mously. He proceeds to show the distinction between the two and to develop the subject of mechanical drawing in what he considers the clearest and shortest method. The hints given are all practical and to the point. The exercises are well selected, and the work tends to a carefully considered climax, that is, the author has aimed to give a complete understanding of the principles of mechanical drawing in this first section, including the various methods of projection. The seventh chapter deals entirely with isometrical drawing, Cavalier projection, and pseudo-perspective, showing the distinction between these methods, and the advantages to be obtained from each. There is also a chapter on spur wheels, bevel wheels, and worm wheels. The second part of the book is entitled "Practical Hints for Draftsmen," and is intended to explain the various modes of representation which are in many cases better than precise methods of projection, on account of the fact that projection will often obscure some point in the drawing. A large number of carefully selected examples are given, and the proper method of drawing each shown. There is also a chapter on freehand sketching, which contains many very useful hints and suggestions. There is a chapter on drawing instruments and materials, in which the instruments and their uses are described.

Elements of General Drafting, For Mechanical Engineers, by C. E. Coolidge and H. L. Freeman. Published by John Wiley & Sons, price $2.50. This book is intended to give a representative course of progressive exercises necessary for a two-hundred-hour course in drawing in the first part, and in the second part a manual of drawing which will convey the essentials of modern conventional drafting, as practiced by the profession of mechanical engineers. The course is divided for convenience into five grades of drawing. The object of the first grade is to give the student some idea of the elementary principles of drafting, together with instruction in the use of materials, instruments, etc. The work progresses by easy stages in the successive grades, to the more difficult drawing necessary in laying out machines from sketches, etc. The second portion of the book, entitled "A Manual on Drawing," treats of the materials required, instruments and their use, and also gives very valuable hints as to the carrying out of the work and the conventional symbols used for representing different parts or materials. There are 21 plates included with the work, which are arranged in such a manner that they can fold out and lie flat and exposed no matter where the book is open, thus enabling the student to refer to anything in the volume without covering up the plate he is studying. The book is bound with a pocket in the back for containing notes, sketches, etc.

ASSOCIATIONS AND SOCIETIES.

Philadelphia Foundrymen's Association.

Howard Evans, Secretary, care J. W. Paxson Co.

The last regular meeting before the summer recess of the Philadelphia Foundrymen's Association was held at the Manufacturers' Club, Philadelphia, on Wednesday evening, June 7, President Thomas Devlin occupying the chair. There were about forty-five members and visitors in attendance, including several ladies. In his opening remarks the president stated that although this was the 148th meeting, it was the first at which the association had been honored by the presence of the ladies, and on this occasion he thought it very appropriate that the program of the evening be set aside for them. Miss Gertrude Beeks, secretary of the Welfare Department of the National Civic Federation, New York City, who had been announced as the speaker for the evening, was then introduced.

Prefatorial to the subject, which included ventilation, drinking fountains, lunch rooms, shower baths, individual wash rooms, locker rooms, and gymnasium for the foundry and machine shop, Miss Beeks explained that the object of the association which she represented was to bring about more rightful relations between employer and employe. In the course of her remarks, which were profusely illustrated with lantern slides, she stated that the parties mostly concerned in industrial disturbances were represented in the membership of the National Civic Federation by prominent employers, labor leaders, and the public.

The Welfare Department of this organization, of which Miss Beeks is the secretary, was organized at the Waldorf, New York, a little over a year ago, the purpose of this department being to promote the welfare work for employes. The 150 members are naturally employers who employ large and few numbers of men and women. Among other photographs of those prominently connected with the federation, one of Mr. H. H. Vreeland, the chairman of this department, was thrown

on the screen. Mr. Vreeland was expected to participate in the discussion of the subject, but on account of sudden illness was unable to attend the meeting.

Miss Beeks stated that the Welfare Department aims to educate employers and convince them of the necessity of showing especial consideration for the welfare of employes, and for that purpose conferences have been had with men who have tried these things and succeeded. In the National Civic Federation Review, a monthly publication, special topics are presented, and picture pamphlets for different trades are in preparation and will be issued shortly. It will be demonstrated, for instance, that portable houses may be supplied for workers in the building trades where clothes and other articles may be kept and luncheon and hot coffee served. Such places are very desirable when you take into consideration the kind of weather in which some men are compelled to work constantly.

Through the Bureau of Exchange of the Welfare Department a vast amount of data may be had and photographs supplied to employers.

The great value of light and depressing effect of dark work rooms was emphasized, poor light being the cause of many headaches. Ventilation by means of sliding doors in the roofs, and the exhaust air system were also alluded to, and the various methods in vogue at different establishments explained. Slides were shown of apparatus employed for removing dust from the foundry, sand room, and the advantage of automatic stokers in use at different places was demonstrated. By means of a series of pipes fresh air is supplied to the faces of the workers. Pure drinking water easily accessible is another essential feature. One method of supply was shown where water is delivered at 55 degrees F. and kept in constant circulation.

A slide was exhibited showing an establishment fitted with individual wash bowls of enameled iron, so constructed that they might be tipped over into troughs, where the water would run off. Shower baths were also installed, and departments well fitted with wire lockers, it being claimed that wooden lockers are not the best on account of the accumulation of vermin, and by the use of wire lockers this danger is not only eliminated but a good source of ventilation is admitted. Methods of drying clothes on steam pipes were also shown on the screen, and the necessity for general janitor service in large establishments mentioned. In many cases the question as to why these facilities were not made use of by the men was answered by the fact that they are inadequate, unclean, too cold and frequently the men do not know of the existence of such accommodations, which were sometimes in remote places. In several instances the floors are of concrete with wooden racks in the individual compartments upon which the men stand, and the entire floor can be easily cleaned by a hose stream. Slides were shown of dressing rooms for women, where the clothing in stormy weather is hung over steam pipes and dried in a method similar to that used for the men.

WASHROOM AND SHOWER BATHS OF THE CLEVELAND CLIFFS IRON CO.

While it is not essential that a girl should be seated all day at her work, yet is necessary that she should sit part of the time, and chairs fitted with back and foot rests according to the height should be provided for her welfare. These can be so constructed on rollers, fitted in grooves, that they may be readily moved from place to place enabling the girl to operate several machines. Photographs were shown of lunch rooms for the officials, the superintendents, and the working classes, and the different styles of lunch counters in use, where some bits of food have a nominal price of three, four and five cents. The attractive and clean lunch room is more apt to be a success than one which is not so

pleasant. In some establishments the junior help have coffee, tea and milk given them.

Rest rooms and hospitals for both sexes were also shown, and the methods of fire protection and the advisability of organizing fire brigades among the younger men suggested, and a description given of some houses for firemen showing the delightful surroundings.

The question of transportation was referred to, showing conveyances for both men and women, and the better method of allowing the girls to leave the factory a few minutes before the men, instead of all at the same time, thus meeting the moral question and preventing the jostling of the girls by the men. Special stress was laid upon the importance of forming men's clubs, where the men may assemble and play pool, and of providing places where meetings may be held once a month; also emergency hospitals where relief may be had in cases of serious accident. Another very good feature adopted by different concerns is the policy of establishing vacation houses, where employes may spend their holidays.

LOCKER ROOM AND SHOWER BATHS OF THE ENTERPRISE MFG. CO.

In some establishments two weeks' vacation is given with pay to all engaged over one year, and in other cases overtime has been abolished with good results. Several views of employes' homes and tenement houses were exhibited, the rent for which is made nominal, and all for the welfare of the employes.

Each industrial establishment is a study. Certain things may be done in one place which may not be applicable to another in the same trade, but in any event constant attention is needed or failure is the result.

A vote of thanks was tendered to Miss Beeks for her most able address, which was backed up by the statement from Secretary Evans that he was going to start in with some of the arrangements mentioned at the plant of the J. W. Paxson Company, as he had been so very much delighted with the subject.

Dr. Brown said that this was the third address on welfare, work that he had had the pleasure of listening to, and that it was by far the best that he had heard, and he could not do less than follow Mr. Evans' lead.

ABRAM COX CO.'S PLANS.

The representative from the Abram Cox Stove Co. stated that that company had organized a club for the heads of the departments, where different subjects were discussed and complaints made every month. He believed that it would lead up to something valuable, but was not prepared to say what has been done at this time. Four meetings have been held and some good has been accomplished, but not in the direction of the welfare of the men. The work has been taken up and he believes it will lead in that direction.

In reply to a question, Miss Beeks said that about twelve wash bowls for sixty employes are sufficient in cases where they have only to wash their hands.

Mr. Thompson said that of all the meetings he had attended, this was one of the most interesting he had heard yet, and he hoped there would be many more like it.

A letter was read from the Pennsylvania Child Labor Committee in reference to the employment of children and calling attention to the fact that certificates issued by notaries are no longer legal but must emanate from the school authorities.

The treasurer's report showed a balance of $2,038.37 and all bills paid.

After an announcement that the next meeting would be held on the first Wednesday in September, the meeting adjourned.

Cleveland Foundry Foremen.

W. H. Nicholls, 608 Gordon Avenue, District Vice-President.

The regular monthly meeting was held June 3d. At this meeting a vote was taken in accordance with which no meetings will be held during July and August, and the next regular meeting will be September 2, 1905, at which time the annual election of officers will occur.

A committee of three was appointed to arrange for a joint outing of the Foundry Foremen Patternmakers some time during August. The same committee was also instructed to arrange for a joint meeting of the two organizations on September 2nd. The members of the Club who were to attend the New York Convention were present and were asked to bring back a report of the meeting for the special benefit of the Club. There was no regular paper, but a general discussion on foundry subjects.

Erie Foundry Foremen.

W. F. Grunau, Dist. Vice Pres., care Erie City Iron Works.

On account of the national meeting in New York, the Erie Foundry Foremen omitted their June meeting. They were well represented at the national meeting, however, and expect to continue their regular monthly meetings throughout the summer.

Hamilton, Ont., Foundry Foremen's Association.

A. Chase, care Sawyer & Massey Co, Secretary and Treasurer.

The regular meeting of the Hamilton Foundry Foremen occurs the last Thursday in each month. The secretary reports that the organization, while not very strong as yet, is one in which the members are taking considerable interest and that they feel sure of a good healthy growth.

New York Foundry Foremen's Association.

S. M. Williams, Dist. Vice Pres., 221 Third Street Elizabeth, N. J.

The regular meeting of the New York Foundry Foremen was held in Jersey City, May 30. A paper upon "What is a Foundry Foreman?" was read by S. M. Williams. The coming meeting of the A. F. A. was also discussed. It was voted to discontinue the meetings until the last Saturday in September.

Mr. Hull, of the American Pig Iron Warrant Co., also gave a talk on the storage of pig iron.

Milwaukee Foundry Foremen.

Thomas Glasscock, Dist. Vice Pres., care Pawling & Harnischfeger Co., Milwaukee, Wis.

The regular monthly meeting was held on June 5. After the transaction of the regular business Mr. Sol. Shaw, of the Allis-Chalmers Co., read a paper on "Foundry Rigging." He explained a revolving gagger chill that he had just made in his shop. There was quite a discussion among the members in regard to loam work. It was decided to hold a meeting every two weeks after the meeting of July 3d, making the meetings the first and third Mondays of the month. July 3d will be the meeting for the election of officers.

Cincinnati Foundry Foremen.

The foundry foremen of Cincinnati and vicinity met May 27 and organized the Cincinnati Foundry Foremen's Association with 20 charter members. The following officers were elected: J. R. Reardon, president; J. H. Ryan, vice president; E. W. Cadwell, secretary; H. J. Holmes, treasurer. The society expects to hold meetings on the second and fourth Saturdays of each month, and there are a number of others to join at the next meeting.

NEW ENGLAND FOUNDRYMEN'S ASSOCIATION.

Fred F. Stockwell, Secretary, care of the Barbour-Stockwell Co., Cambridgeport, Mass.

PITTSBURG FOUNDRYMEN'S ASSOCIATION.

F. H. Zimmers, Secretary, care Union Foundry and Machine Co.

THE ASSOCIATED FOUNDRY FOREMEN.

Frank C. Everett, Secretary, 2113 Third Ave., New York, N. Y., care the J. L. Mott Iron Works.

PHILADELPHIA FOUNDRY FOREMEN.

W. P. Cunningham, Secretary, Pencoyd, Pa.

CHICAGO FOUNDRY FOREMEN.

David Spence, Dist. Vice Pres., 142 Bunker St.

INDIANAPOLIS FOUNDRY FOREMEN.

W. H. Holmes, Dist. Vice Pres., care American Foundry Co.

The Mexican Car & Foundry Co., of Mexico City, Mexico, held its annual meeting on April 20, and elected the following officers for the ensuing year. President, Isaac M. Hutchison; vice president, Lic. P. M. del Rio; secretary and treasurer, R. J. Gross. The principal plant of this company is located at Hutchison, Mexico.

METALS IN FOUNDRY PRACTICE

Devoted to inquiries from Practical Foundrymen on subjects relating to the Melting and Using of Cast Iron, Steel, Brass and Bronze.

The following experts answer questions in this department:

W. J. Keep, Cast Iron.

J. B. Nau, Metallurgy of Steel and Steel Castings.

Dr. Richard Moldenke, Malleable Castings.

C. Vickers, Brass Castings.

We have also made arrangements with several others to act as special contributors upon Brass, Bronze and other subjects. All inquiries should be addressed to the Editor of THE FOUNDRY, and they will then be forwarded to those in charge of the different subjects.

CAST IRON NOTES.

BY W. J. KEEP.

MAKING SAD IRONS.

Can you give me the address of parties making machines for grinding and dressing sad irons and also how to avoid shrinkage on the face of the sad irons? What system is used for cleaning, that is, do they use acid in vats, what kind of acid is used and where can I purchase the vats?

Answer.—It is customary to cast the irons with the bottoms down in the mold and there is very little trouble with shrinkage on the face. You can construct the top of your pattern so that the sagging caused by shrinkage would look as though it was intended to be made that way. It would not pay to increase the cost of the iron to lessen shrinkage. They use the ordinary tumbling mill for cleaning. This is the cheapest way for cleaning castings.

Milling a longer time is cheaper than to use any pickle.

A very good pickle is that made by the Harshaw, Fuller & Goodwin Co., of Cleveland, but the expense for drying and of preventing of rust makes any pickle expensive.

If your sand burns on, you had better prevent that rather than resort to an expensive process for removing it. A sand blast would be better than a pickle for cleaning. The pickle would soften the surface slightly and help the polishing.

The best vat for holding pickle can be made by yourself out of two-inch pine with a one-inch lining and one-fourth inch of pitch between.

Every manufacturer of grinding machines makes those suitable for grinding sad irons.

The large makers use an automatic polishing machine and a good one is made by the Robinson Automatic Machine Co., at Detroit, Mich.

PURCHASING PIG IRON BY ANALYSIS.

Question.—We wish your opinion regarding an iron that has the following composition: Silicon, 2.25; sulphur, .018; phosphorus, .71; manganese, .40. Is this iron No. 1 or is it No. 2?

We have a contract with a furnace for No. 1 iron and another founder in this city has a contract for No. 2 and we find that we are both getting about the same analysis of iron. Our contention with them is that we should have a higher silicon, as we do not find this silicon sufficiently high for our purpose, although the sulphur is very low.

Answer.—The specifications adopted by the American Society for Testing Materials for pig iron in 1904 was for No. 1 pig iron, silicon, 2.75; sulphur, 0.035; for No. 2, silicon, 2.25; sulphur, 0.045. In the absence of a definite understanding a variation of 10 percent of the silicon either way shall be allowed, but for each 10 percent of the silicon below this a penalty of 1 percent in the price of the pig iron shall be required.

We have a contract for an iron having the identical analysis as your iron as to sulphur, phosphorus and manganese, and that no iron shall contain less than 2.25 percent silicon. All iron containing 2.25 and less than 2.50 percent silicon is No. 2, and all iron with more than 2.50 percent is No. 1.

Your iron is certainly No. 2, and you should pay a No. 2 price. An open fracture shows that the furnace is working well and that sulphur is low, but for your business silicon is a necessity.

BRASS FOUNDRY NOTES.

BY C. VICKERS.

PHOSPHOR BRONZE.

Question:

Could you give me a phosphor bronze mixture that would resist the acids used in a paper or sulphite mill? Also what is the best way to put the phosphorus into the mixture? Could you give any other formula for a bronze that would resist acids without the aid of phosphorus What is the difference between a brass and a bronze?

Answer:

A good alloy of phosphor bronze for the above is copper 90 percent, phosphor tin 10 percent.

Alloys of copper with zinc are known as brass, of copper with tin as bronze.

MANUFACTURE OF SASH WEIGHTS.

The writer has recently been asked the best way to make sash weights. There are so many factors which enter into this problem that it is practically impossible to state any best method under all conditions. To make sash weights at a profit each separate operation must be considered by itself and its cost reduced to a minimum. For any moderate tonnage of standard sizes most foundries prefer to use some form of stripping plate molding machine. In most cases special machines are fitted up which make a mold, the cope and drag of which are exactly alike, so that as these blocks of sand are packed up on top of the other, they form a series of molds, the upper face of each block being a drag and the lower face a cope. These molds are stacked up three feet or more in height and the whole pile poured at once. The Adams Co., of Dubuque, Ia., had one of these machines on exhibition in the Model Foundry at the Exposition at St. Louis, Mo. Where the tonnage is not sufficient to warrant the fitting up of a molding machine, and especially where a large number of sizes are required, the weights are usually made by attaching the half patterns to the opposite sides of a match board. In this case, of course, it is necessary to use pins such a length that they will extend through the match board and still keep the parts of the flask in line. After both cope and drag are rammed up, the cope is lifted up, the match board removed and the mold closed. Where a very large tonnage of standard sizes are to be made, water cooled chills are some times employed for making the smaller sizes. From two to four molds are formed in each chill. The two halves of the chill are hinged together and placed in a vertical condition. After the weights are poured and have solidified, the chill is opened, the weights removed and the screws broken off. It is all that is necessary to finish the pieces, provided the chills fit closely enough so that there are no thins. Such a set of chills are expensive to make and the investment would only be warranted in a foundry which made a specialty of sash weights.

HARRY MALONE.

Marion Denman, of Troy, O., and Wm. Doyle, will start a pattern shop at Piqua, O.

The Forsythe Pattern Co., of Youngstown, O., has been incorporated with a capital of $50,000. The incorporators are F. A. Runser, G. J. Renner Jr., W. H. Park, John Stambaugh, and Geo. Rudy Jr.

MAKING A MOLDER.*

BY H. M. LANE, CLEVELAND, O.

The molders of the past have been produced, first, by serving an apprenticeship, and second, by adding to the knowledge thus gained by traveling about and working in different shops. In the days when all foundries carried on a general line of work and but little machinery was used in the foundry, this procedure would produce an all-around molder.

In most cases these old-time molders were very good judges of the various local irons, and many of them would make creditable mixtures by judging the fracture. In the present day, however, a great many new factors have been introduced into the problem. In the first place the iron now furnished the foundryman varies between much wider limits and may contain greater quantities of impurities than that formerly furnished.

In the molding work itself two factors have entered the foundry trade which tend to produce specialists rather than all-round molders.

First, the various foundries have been led to specialize to the greatest possible extent. One of the first specialties to break away from the general foundry business was stove plate trade, and this has now become so thoroughly separated that it is recognized as a distinct branch of the trade, and stove plate experience would be of but little use to a man if he were placed in a general jobbing foundry doing light or medium weight work. Many other specialties have split off from the foundry business, such as cast iron pipe, soil pipe, ingot molds, radiators, bath tubs, and other sanitary plumbing fixtures, etc. In addition to this, the malleable industry has become so specialized that the molders belonging to this division of the craft do not generally pass back and forth between malleable and gray iron foundries.

Second, many factors have been introduced into the shops themselves, the principal among these being the molding machine. The result of all this is that the high-grade molder for light floor work does not find the demand for his services which formerly existed; at least in proportion to the tonnage for this class of work that is turned out. The heavy workmen have suf-

*Paper read at A. F. A. Convention.

fered less from the changes that have taken place, on account of the fact that the methods of producing castings in this department have not undergone such radical changes. An all-round molder, however, should have experience in both light and heavy work.

The rapid fluctuations in the amount of work of each character being done in the foundry have also had a serious effect on the apprenticeship question. While the shop may have work enough at one time to warrant their employing a considerable number of apprentices, within a year of that time the character of the work upon which they can use apprentices may have all gone to the other fellow.

Apprentices have also been affected by the "Big wages quick" mania. As a consequence, after the boy has spent about half of his time in one shop, he is very likely to bolt and go into another shop where he gets journeyman's wages, or, if he is taken under instruction, gets much higher wages than he received in the first shop. When the wages go up the amount of work he turns out must also go up, and hence he is kept as largely as possible on one class of work. The result is that he becomes a poor workman with a limited amount of experience.

One foundryman stated recently that while he employed over one hundred molders in his place, his work was so highly specialized that he could not conscientiously take on a single apprentice, as he knew he could not teach them the trade, no matter how much he might desire to do so.

Skilled molders will always be required for some classes of work and we must provide some means for keeping up the supply of this class of men. Another factor, and one which is in some ways more important is the question of our future foundry foremen. As the work in the different foundries is more highly specialized, and as the number of difficult problems in the line of equipment increases from year to year, it results in an ever-increasing demand on the ability of the foundry foreman. The trade of molding could not be learned from a book, but more book knowledge is required now than formerly. The problem of where our future foundry foremen are coming from affects other departments of the shop as well as the foundry, and hence some of our brightest men have been discussing the subject and proposing different plans for its solution.

What seems to the writer one of the most feasible plans is to install a plant for the manufacture of quite a broad line of machinery. The plant should be large enough to employ about one thousand hands in all departments. It might manufacture the following line of machine tools: lathes, planers, milling machines, drill presses, and grinding stands. It should also manufacture a line of gas engines and of steam engines. It might also be well to manufacture some sheet metal working machinery and some wood-working machinery.

This would give a broad range, including a large amount of foundry and blacksmith shop work. The line of machinery could be disposed of to advantage by selling the entire outfit to some large jobbing house like Manning, Maxwell & Moore. In the foundry it would also be well to make some specialties requiring no machine finish, as for instance, track plates, stove legs, or something of the kind which could be gotten out largely on molding machines.

Connected with the establishment there would be a corps of teachers; and a regular course would require four years, distributed somewhat as follows: The student upon entering would spend nine months in a series of shop work which would correspond very closely to the shop work given in a manual training school. This would include some wood work, some patternmaking, a little experience on light work in the foundry, a few weeks in the blacksmith shop, and some time in the machine shop. This work would be accompanied by an elementary course of lectures upon these subjects or by studying in textbooks along these lines.

When a boy enrolled he would be expected to pay down one hundred dollars. During the first nine months he would receive no pay; and if at the end of this period he decided he did not want to learn the trade, he would be allowed to go and be given back one-half of the money he had paid in. If at this time he did elect to learn a trade, he would have to choose which trade he wished to follow. If he wished to follow the foundry trade he would first be put onto a molding machine and taught how to make a large number of different

classes of molds in this way. This work would include instruction in the theory of molding machine construction and manipulation.

From the molding machine he would pass to the core department. In this department he would receive instruction in the making of cores by hand, and with the use of various types of machines. He would also receive instruction upon the value of the different core compounds or binders.

From the core department the boy would go to the light work floor, where he would spend some time, and then to the heavy work floor, where he would receive instruction both in green sand and dry sand work, also in loam work. This general course would occupy approximately two years and three months. The boy would then select his specialty and spend the last year on it.

Some instruction would be given in mixing iron by analysis, etc., and if a boy wished to become a foundry chemist there would be a post graduate course for this purpose, extending through the fifth year. After the first nine months the boy would receive pay for his work at a certain fixed rate. Careful account would be kept of what he did, and if he exceeded a certain amount of work, he would be given a bonus above the fixed rate of pay, but all of this bonus would be kept back until he was through with his course. When he finished his course he would receive a certificate or diploma, would be paid back the original one hundred dollars which he deposited, with four percent interest, and would also be paid all accumulated bonuses, which in some cases might amount to several hundred dollars. The accumulation of this big bonus, together with the fact that if he left any time after the probationary nine months' period he would lose both the bonus and the hundred dollars, would serve as an incentive to keep the boy at work to the end of his course. In starting such a school it would be necessary to employ journeymen enough to run the entire factory, and it would always be necessary to employ some journeymen to act as head workmen and instructors, but after the third year it should not be necessary to employ more than ten percent of journeymen, as by this time the boys would become pretty expert mechanics.

The education necessary for entering such a school would be simply a good common school education. The studies given during the course would be the equivalent of a high school education, or at least of the portion of it required by workmen of this class. Such an institution as this should be self-supporting after the first year or so, as while the boys would undoubtedly spoil a large amount of material, this would be in large measure offset by the fact that the boys would work for work's sake, in other words, would not soldier. While such a plant as this would not have any dividends to pay, it would nevertheless have to support the teaching force, which would probably be equivalent to a fair dividend on the capital invested.

The boys would probably work on an eight-hour basis, but would have recitations taking all or a portion of some of the half days, for instance, one class would have their recitations on Monday, Tuesday, and Friday mornings, another on Tuesday, Thursday, and Saturday mornings. In like manner the others would have afternoons of the alternate days. The plant would run six days a week throughout the year, with the exception of the ten days or two weeks' shut-down at the holidays, and the granting of such holidays as Decoration Day, Labor Day, Independence Day, and Thanksgiving.

Such a school as this would make an excellent preparatory school for our technical schools and colleges, and while the graduate from this trade school would go to a technical school conditioned in foreign languages, he would receive credit for shop work which would more than balance his deficiencies in languages. For boys who wished to become foremen and managers, a fifth or post-graduate year could be arranged in which a course would be given on shop management, shop systems, etc. The students in this fifth year would be given positions as foremen or assistant foremen in different departments in the works.

One very important feature in this system would be the necessity of preparing a special course of text-books to fill the exact requirements of the case, and upon the preparation of such a series of books the success of the school would in large measure depend.

The ideal location for such a school is a subject which should receive considerable attention. If placed in a large city it would

be possible to arrange visits to other works; the libraries of the city would be available to the students and there might be some support from other works. If located in a small town 25 or 30 miles from a large city, the high city taxes would be avoided, there would be less going on at night to take the boys' attention from study, and it is probable that the works could be built on a somewhat more extensive plan, with more yard room, dumping ground, etc., which is a point worthy of consideration.

MELTING STEEL WITH CAST IRON.*

BY R. P. CUNNINGHAM, HOLYOKE, MASS.

The demand for castings to stand great strength has increased to such an extent that foundrymen are often at a loss how to produce castings up to the required specifications. The manufacturers who are the most often called upon to produce castings of high strength are pump and engine builders, tool makers and car wheel manufacturers.

Take pump builders a few years ago; is was something very unusual to receive an order for a pump to stand a pressure of more than 1,000 lb. Today it is nothing uncommon to get an order for a pump to work under a pressure of 5,000 lb. and even higher. Engine builders are called upon to build engines to work under 200 lb. steam pressure, while it is only a very few years that 100 lb. pressure was considered about the limit.

I might say the same thing about tool making. The speed that the modern tools are run at today is nearly double that of a few years ago. Look at car wheels and compare the tests they are subjected to today with that required 25 years ago. The increase is over 100 percent. Yet car wheel makers have managed to make wheels that come up to the requirements. I might go on and enumerate many other branches of the trade that are doing what was once considered an impossibility. This goes to show that the foundrymen of today are alive to the requirements, and yet we often hear men say that the foundry has not progressed as fast as other branches of manufacturing.

On the contrary, considering the attention that has been paid to the foundry, we have managed to make castings that have been far above the specifications called for. Foundrymen do not always have the iron in their yard to make castings of any required strength, but by a judicious use of steel scrap we can produce castings of the strength desired.

Any one familiar with pump work will readily understand the necessity of having a perfect casting, not alone smooth and true to pattern, but clean, close grained, yet soft enough to machine easily. Many castings go through the machine shop and erecting room, but fail when put under test. This adds cost to the manufacturing cost, as often the machining is many times the cost of molding. By adding a percentage of steel scrap we have in a great measure overcome this difficulty if the trouble is caused by porosity of the metal.

When melting steel with cast iron there are many things that require close attention in order to obtain the very best results. In charging the cupola one cannot be too careful and should be absolutely certain that all the material called for in the charge is put in. The weight of each material specified should be correct, the fuel and fluxes should be analyzed so that the exact composition of all the materials going into the iron to be made may be known.

In making high grade metal we have to contend with the impurities of the fuel and fluxes charged into the cupola besides that we have estimated on in the metal. All impurities in excess tend to weaken the metal in tensile and transverse strength, for this reason there is more difficulty in making a successful cast when using a large percentage of steel scrap.

A high percentage of steel necessarily increases shrinkage, demands closer attention, requires more rapid handling in the foundry, and when very high tends to make all the operations connected with it draw away from those of a cupola metal and approach that of a steel casting. When this extreme point is reached melting in the cupola becomes very unsatisfactory.

The average thickness of a casting bears a relation to the percentage of steel desirable. For thin castings only a small percentage can be used, while for thick heavy castings a large percent is permissible. This is so because a thin casting has no self-annealing power on account of its rapid cooling, and the chilling effects of the mold. The thicker casting, on account of its slower cooling, anneals itself somewhat, and opens the grains of the metal perceptibly. The same metal in a thin casting, which is hard, would be quite soft in a heavy casting. My opinion is that it is more desirable to have a mixture with the smallest

*Paper read at A. F. A. Convention.

percentage of steel that will give sufficient strength and solidity to the casting for all practical purposes.

We sometimes doubt the wisdom of the engineer when he calls for castings that will stand so many thousand pounds to the square inch, because the metal that will stand the highest test in the bar is not always the most desirable. It may be brittle or flaky, with no elasticity, and yet test high. What we aim for in practical foundry work is a high grade metal that will stand a fairly high test and machine easily. It is this kind of a casting that can be made with a percentage of steel scrap melted with your iron, provided the rules are accurately followed.

My method of charging a cupola is as follows: Let us say that we want to make a casting which will require 4,000 lb. of metal, with 25 percent steel. With a cupola that lines up 48 in., we put on the bed 1,200 lb. of coke, on top of this put 1,000 lb. of iron, then 500 lb. of steel, then 500 lb. of iron, then 150 lb. coke, 500 lb. steel, 1,500 lb. iron. The coke next above the metal charge should be greater than between the ordinary charges, and the pig iron in the next charge above the steel should be of the same chemical analysis as the iron used in the steel, so that if any metal should melt and run into the steel it will do no harm. With the last amount of steel we add 1¼ lb. of ferro-manganese to every 100 lb. of steel used. We also put the same amount of ferro-silicon into the ladle. This should be done after the first metal has been drawn into the ladle. This metal should be poured as soon as it becomes quiet in the ladle.

If the casting is uneven in thickness attention must be given the shrinkage. Setting a riser on the heavy parts and after the mold is full pouring slowly until the riser is full obviates trouble. If the casting is very heavy it will be necessary to feed it, but an ordinary casting will not require this.

We have found by using two brands of iron, one high in manganese and the other high in silicon, both low in sulphur, that we can get a much finer grained casting, with more elasticity, than we could if we depended on ferro-manganese and ferro-silicon to bring these two elements up to the desired percentage. I reason it in this way: If the manganese and silicon are in the pig they are more evenly distributed than when they are put into the cupola and depended upon to become thoroughly mixed in it or in the ladle. We have never yet depended upon the pig for the entire amount of manganese or silicon wanted, but have added each in the proportion given above.

We sometimes have trouble caused by wrought scrap or hard steel becoming mixed with the steel scrap. In either case satisfactory results cannot be obtained. With hard steel there are hard spots in the casting, while wrought iron increases porousness which is very bad if the casting is uneven in thickness.

My opinion is that mixtures of this kind will in the future be used to a greater extent than they have been in the past because the demand for this class of castings has increased and foundrymen will readily see that by this means they can build up their present mixtures to show greater strength and other desired qualities.

The result of eighteen casts with different percentages of steel showed that the highest amount of steel that could be used to an advantage is 33 percent. Above this showed excessive shrinkage and only a slight gain in strength. The highest point reached for tensile strength was 33,205, the lowest 31,890 for perfect bars. The highest transverse strength shown was 3,335, the lowest for a perfect bar was 3,180. Six bars were cast from each heat, two at the first part, two in the middle of the heat, and two at the end. In every case the two bars cast in the middle of the heat showed up best in tensile and transverse strength. The first bars were not uniform and showed small pin holes. The last bars showed up badly in every instance. Less trouble will be had with less than 33 percent than above that amount of steel scrap in the gray iron mixture.

For ordinary work 25 percent steel will give sufficient strength for all practical purposes, will machine easily and yet be close grained. This is the percent I would recommend foundry men to use unless it is for some special work. In conclusion I will say that I will be only too glad to answer any and all questions in regard to use of steel in cast iron, for I feel sure that when once tried, that great benefit can be derived.

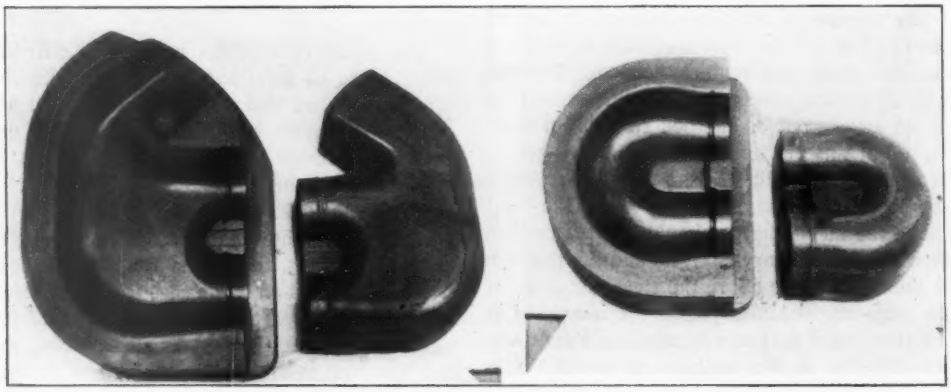
THE USE OF PLASTER-OF-PARIS IN THE FOUNDRY.*

BY EDWARD B. GILMOUR, PEORIA, ILL.

The title of this paper may seem a little strange but as plaster of Paris is used to a great extent in most of the arts, it will not be so surprising to find it occupying a little corner in the foundry.

*Paper read at A. F. A. Convention.

Plaster of Paris is gypsum burnt in a kiln at a temperature of 250 degrees and subsequently powdered and ground to a fine uniform flour. When so prepared it possesses the valuable property when mixed with water of setting into a solid mass. It receives its name from the fact that it is mined in great quantities in the environs of Paris and is used to a large extent in art work. It takes a place in the foundry in the form of patterns; some founders use it to a large extent in making match boards. These match boards are not very satisfactory if they are kept in constant use as they are brittle and consequently very easily broken. While upon this topic I would say that good match boards are made from a mixture of litherage 3 parts, parting sand 90 parts, and linseed oil 7 parts.



THE USE OF PLASTER-OF-PARIS IN THE FOUNDRY.

In a large agricultural establishment with which I was formerly connected we used as much as 20 barrels of plaster of Paris per month, so it can be readily seen to what extent the material was used in this one place. It was the means of saving thousands of dollars in producing their work. We used it principally in the making of patterns for drop hammer dies in order to straighten the malleable castings which had become warped in the process of annealing.

Our method of procedure was to take the original metal patterns before being gated up, place them in the sand as you would if you intended to cast them; viz., up to the joint, making the joint in the regular fashion and as straight as possible. It is good practice to prove the drawing of the patterns so as to get the joint in the best place in order to get out the malleables after having been straightened. Now get a common wooden box, place over the mold, see that it has plenty of taper so as to facilitate the drawing of the plaster cast from the sand. Coat the mold with oil, mix the plaster with warm water (as you will get better results in setting), to a consistency of thick cream. Pour it into the box or flask upon one-half of the mold, and when solidified roll it over and take away the sand which made the original mold, leaving the patterns in place. Dress up the joint, again coating over the mold with oil, and repeat the operation upon the plaster mold, which will give you a perfect impression of the casting which you have to straighten. It is essential to cast a nut or something similar into the plaster in order to draw the plaster pattern out of the sand after it has become hard enough. It is necessary to trim up the mold, separate it and withdraw the patterns, repair all of the defects, and give the casts a coating of shellac varnish. They are then ready for use.

Some one may wonder why we use the original patterns in order to make the plaster patterns. The reason is simply this, that when you cast the dies from the original patterns you have the shrinkage of the casting in the die, you have also the shrinkage upon the malleable casting. It will be said that malleable castings shrink more than grey iron, which they certainly do. In making the patterns for malleable castings we allowed the same shrinkage as in grey iron, viz., one-eighth inch to the foot, but with the process of annealing the castings expand enough to bring "malleable" to a uniform size with grey iron castings, consequently the castings are of the same size as the impression in the dies.

The accompanying cuts are two sets of drop dies for the pipe connections for a grain weigh-

ing machine, the smaller ones being used for the top dies. The method for making these plaster casts is a little more intricate, the molds being made as you would make a regular loam mold, with sweeps having a frame made of the flat section, with pin holes on the centers, so that the sweeps will work on the circle as you would make a regular elbow or Y pipe.

In order to get as true and perfect castings as possible we are very careful not to rap the patterns sideways, only a slight tap downwards being given. When the pattern is drawn no tools are used upon the face of the mold; simply take a camel's hair brush with wet blacking and carefully paint this on as regularly as possible; afterwards skin-dry the mold and you will have a perfect casting. We usually make these molds in iron flasks so that we can leave them over night in the sand as it tends to toughen the metal, which, in fact, is a high grade iron. These castings are subjected to very heavy strains on account of the continued pounding of the drop hammer.

PERSONALS.

C. R. H. Cunningham, formerly with the Chester Steel Castings Co., Chester, Pa., has severed his connection with that company, and is now associated with H. M. Shimer & Co., Philadelphia.

Joshua Peters, general manager of the Record Foundry & Machine Co., Moncton, N. B., has recently returned from a trip to the Pacific coast, where he established new agencies for his company.

George Whitehouse, of West Bramwick, Stratfordshire, England, foundry manager for the J. & S. Roberts Co., of West Bramwick, will spend three months with relatives at Lorain, O.

Geo. J. Chandler, formerly secretary and assistant treasurer of the Cleveland Steel Casting Co., of Cleveland, has become associated with the Sterling Steel Foundry Co., of Pittsburg, as general sales agent.

Mr. Jas. Hall, foreman of the molding department of the Mississippi Valley Stove Works, of Fulton, Ill., has resigned his position to accept a similar position at the Riverside Stove Works, of Rock Island, Ill.

Chas. A. G. Winther, for many years general superintendent of the Chapman Valve Mfg. Co., of Indian Orchard, Mass., has accepted a similar position with the Roe Stephens Mfg. Co., of Detroit, Mich.

Charles R. Darrow has resigned as president and general manager of the Mahoning Foundry & Machine Co., Youngstown. He is still a stockholder and a director of the company. F. G. Evans is in temporary charge of the company's affairs.

DEATHS.

Isaac Wardwell, for 50 years associated with Geo. Waring in the foundry business and who later organized the Stamford Foundry Co., died at his home in Stamford, Conn., May 20. He was born in 1815.

FIRES.

The foundry plant of Kilburn, Lincoln & Co., of Fall River, Mass., was damaged by fire to the extent of $40,000 on May 17. This is one of the oldest and best known plants in the region and has long been noted for the looms which bear its name. J. Thayer Lincoln, one of the owners, succeeded in saving a box of drawings which represent the work of years and are of great value to the company.

A small patttern storage building, belonging to the Kerr-Murray Mfg. Co., founders, of Fort Wayne, Ind., was destroyed by fire on May 14. The principal loss to the company was the patterns, some of which were valuable.

The foundry plant of F. A. Potts & Co., of Indianapolis, Ind., sustained a loss of $4,000 by fire on May 26.

The plant of the Ohio Brass Co., of Mansfield, O., was damaged by fire to the extent of $100,000 on May 24. The loss is fully covered by insurance.

Guest & Co.'s foundry at Pottstown, Pa., was damaged by fire to the extent of $1,500 on May 25.

A three-story brick building belonging to the Gobeille Pattern Co., at the corner of Leonard and Winter streets, Cleveland, was damaged by fire on June 8. The loss is estimated at about $12,000.

The plant of the Elizabeth Iron Works, of Norfolk, Va., was seriously damaged by fire on May 10th. The fire started in the pattern shop. The most serious loss was the destruction of a large stock of patterns, which had been accumulating for many years.

The Chalmers-Williams Co. has taken possession of the U. S. Foundry & Supply Co.'s building in Chicago Heights, Ill. The plant will be enlarged and devoted to the manufacture of railway and mining supplies.

NEW CONSTRUCTION.

The White-Warner Co., of Taunton, Mass., manufacturer of furnaces, stoves and ranges, is to erect a new foundry building to replace the one destroyed by fire last year. The building will be 62 x 167 ft.

Wm. Wharton Jr. & Co., Inc., Philadelphia, through Ballinger & Perrot, architects, have completed plans for a two-story fireproof pattern shop and storage building, 60 x 247 ft. at the corner of Twenty-fifth and Ellsworth streets, Philadelphia.

The Best Foundry Co., of Cleveland, O., will erect a large foundry building for the production of stove parts at Bedford, O., and has commenced the construction of the buildings. The contract for designing and constructing the buildings has been let to The Interstate Engineering Co., of Bedford, O.

J. R. Baker & Sons, of Kendallville, Ind., are constructing an addition to their foundry which will increase their molding room so as to accommodate more men. The plant is located at Kendallville.

Deere & Co., Moline, Ill., have had plans prepared for the construction of an addition to their foundry 60 x 150 ft This will make their foundry 120 x 150 ft.

The Janesville Machine Co., of Janesville, Wis., will expend $25,000 in additions to its plant, which will include an extensive addition to its foundry.

The Southern Co-operative Foundry Co., of Rome, Ga., will double the capacity of its plant by making additions and installing new equipment.

A car wheel foundry will be erected as an addition to the plant of the Wm. J. Oliver Mfg. Co., of Knoxville, Tenn., and Mr. Oliver states that about $60,000 will be expended in the construction of the plant.

The Wichita Mfg. Co., of Wichita, Kansas, will expend $8,000 in the construction of a new foundry building.

J. G. and Geo. A. Enos are completing a building 50 x 60 ft. with an "L" 16 x 16 ft. at Waterloo, Ia. The building is to be used as a foundry and will be under the direct supervision of Mr. J. G. Enos.

Davis, Stewart & Co., of Lowell, Mass., are building an addition to their foundry 30 by 40 feet.

The St. Albans Foundry & Implement Co., of St. Albans, Vt., is enlarging its plant and installing new machinery to enable it to manufacture a special line of gasoline engines.

The contract has been awarded for the construction of a second section of the foundry of the Brown & Sharpe Mfg. Co., of Providence, R. I.

The plant of the Record Foundry & Machine Co., at Livermore Falls, Me., is to be extended.

The American Locomotive Co. has completed arrangements whereby it will manufacture for the United States and Canada the Berliet automobile, a French car. Although one or two foreign designed cars are built in the United States, this will be the first experience of an American concern making a foreign car with American material and American labor complete in every detail. The American Locomotive Co. is one of the largest builders of machinery in the world. It is the intention of the company to make automobiles an important branch of its present manufacturing system. The first plant will be built in Providence, R. I., adjacent to the Rhode Island Locomotive Works.

The American Locomotive Co. has commenced the construction of a brick foundry 175 x 650 ft., in connection with the Brooks Locomotive Works at Dunkirk, N. Y. The foundry is to cost $150,000.

R. D. Wood & Co., iron founders, Philadelphia, have purchased the Quinn & Sharpless building, and will erect a modern office building over the present structure.

The Hayes Mfg. Co., of Erie, Pa., will erect two new buildings, one of which is to be a foundry.

The Taylor-Wilson Mfg. Co., of Allegheny, Pa., has completed its concrete machine shop at McKees Rocks, Pa., and is now erecting a foundry adjoining the same.

The Globe Iron Foundry Co., of Johnstown, Pa., has found it necessary to increase its equipment to keep pace with its rapidly growing business. A new cupola and electric crane and some additional equipment is to be added.

The contractors are pushing the work on the improvements of the Reading Stove Works at Reading, Pa., which include an annex to the foundry and several other buildings.

The North Lebanon Foundry Co., of Lebanon, Pa., which was organized about April 1, has its new buildings well under way and expects to be in operation about July 1.

John Snell is erecting a new foundry at Columbia, Pa.

The Mason Heater & Foundry Co., of Bellaire, O., has its new plant in successful operation, the first castings having been made June 8.

The company will increase the capacity of its plant by the addition of a small brass foundry.

The Reder Foundry Co. will construct a $100,000 foundry plant at Cincinnati, O.

A brass foundry department will be added to the plant of the Pittsburg Valve & Fittings Co., of Barberton, O.

Work was commenced at New Castle, Ind., on the building to be occupied by John S. Allan and others for a brass and iron foundry and machine shop. The building is 40 x 120 ft., and the plant is expected to begin operations within 90 days.

The Buckeye Engine & Foundry Co., Rockdale, Ill., has outgrown its present building, and will construct additions for a new office and pattern shop and additional machine shop space.

The Reidy Foundry Co., Chicago, Ill., is building a new foundry at North Forty-seventh avenue and Cornelia street after plans by W. L. Stebbins. The building will be large and of irregular ground dimensions. It will cost about $50,000 and will be of brick and iron construction.

The Aurora Foundry Co., of Aurora, Ill., is erecting an addition to its plant, 70 by 70 ft.

The new foundry of McCarthy & Malanski, Cairo, Ill., is almost complete, and will be occupied within a few weeks. The latest improved Whiting furnace will be installed.

The Chicago Hardware Foundry Co., of North Chicago, Ill., is making several extensions and additions to its plant.

The Northwestern Engineering Co., of Duluth, Minn., is now making plans and specifications for a 20-ton steel foundry, to be located in Duluth, West Duluth or Superior. The foundry is to be built for a company organized by Duluth, St. Paul and Milwaukee capitalists. The company will be capitalized for $250,000.

The Lusk Foundry Co., of Jackson, Mich., poured its first iron on May 10. The business starts with very bright prospects.

Work on the new molding room of the Malleable Iron Works, Beaver Dam, Wis., is being rushed to completion. The new addition will be 40 x 200 ft. and adjoins the present plant of the company. It will be used for floor molding and will contain a furnace and stack.

Plans for the erection of a new steel casting plant for the Prescott Co., at Menominee, Mich., are now being prepared and the work will commence July 1.

The Grand Rapids Foundry Co., Grand Rapids, Mich., is preparing to start the work on its new shop. The new building will be constructed of concrete blocks.

The Portage Lake Foundry & Machine Co., of Hancock, Mich., has nearly completed the additions to its plant which were started some time ago.

The La Crosse Plow Co. is making improvements in its foundry at La Crosse, Wis., which will cost about $7,000.

The city of Baltimore has created a special committee for the encouragement of manufacturing plants to locate there. The object of the body is to provide ways and means for the establishment of new manufacturing industries and to conduct a systematic campaign of advertising the advantages to be enjoyed by new industries in Baltimore.

The Atlanta Iron & Brass Bed Co., Atlanta, Ga., recently incorporated, has completed its organization with John L. Coleman, president; W. R. Ware, vice president; N. T. Sprate, secretary. A two-story building, 100 x 200 ft. is being erected.

Ernest M. Loeb has purchased the plant of the Consumers' Ice Co., of New Orleans, La., and expects to erect a large foundry and iron works on the site.

The Sheffield Cast Iron Pipe & Foundry Co., of Sheffield, Ala., has a large force of men engaged in the construction of its new plant. The contract for the buildings has been awarded to Harry B. Austin.

The Richmond Foundry & Mfg. Co., of Richmond, Va., is installing additional machinery for the manufacture of specialties.

The Wm. J. Oliver Mfg. Co., Knoxville, Tenn., has decided to double the capacity of its plant, and operation will be started as soon as possible. A new foundry will be added and the present foundry building will be used for additional machine work.

The contract for excavations and foundations of the new Gray & Dudley foundry, Nashville, Tenn., has been let to Foster & Creighton, and work will be started at once. The building will be 200 x 110 ft., and will be completed about Aug. 1.

The frame work for the pattern and general wood working department of the El Paso Foundry & Machine Co., of El Paso, Texas, has been completed and the building is being pushed forward to completion as rapidly as possible.

The foundry of the Hartwell Iron Works, Houston, Tex., is now being operated at its new plant.

Noah Erickson, of Fairfield, Ia., is pushing

the construction of his new foundry as rapidly as possible and hopes to be turning out iron castings in the near future.

The Adams Co., of Dubuque, Ia., has purchased the Hotel Paris, of that city, and as soon as the lease of the present holder runs out, will remodel the building for foundry purposes.

The national artillery foundry of Mexico City, Mexico, is being improved and enlarged. The work is under the charge of Colonel Ibarra.

GENERAL INDUSTRIAL.

Mr. Wm. J. Roche, of Lake street, New Britain, Conn., has opened up a new brass foundry with eight or ten molders and reports that he is doing a very good business.

E. C. Childs, for 38 years employed in the brass foundry of the Fairbanks Scale Works, St. Johnsbury, Vt., has resigned his position in order to enter into partnership with E. T. Woods in conducting a brass foundry at Lyndonville, Vt.

The name of the Imperial Foundries Co., of Calais, Me., has been changed to the McAdamite Foundries Co.

The American Wood Working Machinery Co. has decided to consolidate two or three of its present branches into one company, and has purchased real estate at Rochester, N. Y., for the construction of a large foundry, machine shop, pattern shop and general offices. The company expects to put up first-class modern buildings, fire-proof or slow-burning construction, and its new location will give it the necessary shipping facilities.

The Bernstein Mfg. Co., Philadelphia, has completed plans for an addition, 60 x 135 ft., to the foundry building.

The Brylgon Steel Casting Co., New Castle, Pa., is building two ovens in addition to the three now in operation, and will shortly build two more.

The Kennett Foundry & Machine Co., of Kennett Square, Reading, Pa., has been incorporated with a capital of $50,000.

The entire property of the Fleetwood Foundry & Machine Co., of Fleetwood, Pa., with the exception of one building previously sold, has been disposed of to J. W. Johnson, of Reading, Pa., and Ephriam Hartman, of Oley.

The Aultman Co.'s plant at Canton, O., was sold recently to E. G. Tillotson, president of the Cleveland Trust Co., who represented the creditors, for $262,500. The total liabilities of the concern are about $4,000,000 and it is stated that the creditors will get about 5 percent of their claims.

The Bayless Stove & Range Co., of Cincinnati, O., has been incorporated with a capital of $50,000. The incorporators are D. B. Bayless, W. M. Allen, F. L. Garrison, N. S. Bayless and N. J. Utter

The foundry recently erected by L. J. Jackson at the rear of the McLaughlin Iron Works, Ashtabula, O., is in operation.

The Cincinnati Foundry Co., of Cincinnati, O., has beeen incorporated with a captal of $10,000 by John W. Schwoever, P. A. Schwoever, L. C. Ultrck, John D. Berger and W. H. Bowers.

The Lawton Foundry & Machine Works, of Wabash, Ind., has been sold to the Wabash National Bank for $8,500 by John H. Dicken, trustee. The plant has been in operation ever since the death of Mr. Lawton, but what will be done with it in the future is not known.

The Potter & Johnson Machine Co., of Providence, R. I., are making several additions to their works, including a pattern shop 35 by 38 ft.

The business which has in the past been carried on under the name of Law Bros. & Co., Caledonia Foundry, New Edinburgh, Canada, has undergone a change of management, by which the partnership has been dissolved, though the business will be carried on by one of the brothers.

The Cheboygan Boiler Works, of Cheboygan, Mich., will add a machine shop and foundry to their plant, which will give employment to 12 or 15 more men.

Buck & Mullen, contractors, of Muskegon, Mich., are erecting a new foundry building, 73 by 236 ft., for the Muskegon Boiler Works, Muskegon, Mich.

Plans have been sent out for a one-story addition to be erected to the plant of the Montford Machine Casting Co., of Baltimore, Md.

The contract has been awarded by the Mississippi Foundry & Machinery Co., Jackson, Miss., for the construction of an addition to its plant, 50 x 100 ft.

The Bessemer Foundry & Machine Co., Bessemer, Ala., has received a new 25-ton traveling crane to be installed at once. The company will build an addition to its plant, 150 ft. long. When the new structure is completed the entire building will be 400 ft. long.

The Hoover Stove & Casting Co., of Kansas City, Mo., will build a brick addition to its foundry, to cost $2,500.

The Atlas Brass Mfg. Co., of Cleveland, O., has been incorporated with a capital of $50,000. The incorporators are E. Rickersberg, S. P. Fisher, L. Rickersberg, J. H. Fisher and Sol. H. Rickersberg

The Dayton Pneumatic Tool Co., of Dayton, O., has opened an office in San Francisco, Cal., at 421 Market street, which will be in charge of Mr. Henry Engels.

The old Middletown foundry and machine shop, of Middletown, Ind., is being dismantled and much of the machinery and material moved to Newcastle, Ind., where Jonathan Allen is installing a foundry.

The charter of the Evansville Foundry Association, Evansville, Ind., expired in 1898. Some months ago one of the owners brought suit for accounting of the co-partnership which has existed since that time. This resulted in the appointing of R. D. Richardson as trustee. On May 18th the trustee sold the plant to Geo. Dauble and Marcus Sonntag for $109,500. The purchasers, headed by Geo. Dauble, will discontinue the use of the corporation name of the Evansville Foundry Association and will do business under the name of the Advance Stove Co. The other stockholders, who have sold their interests, have formed a new corporation called the Evansville Foundry Association, and will build a new plant. The foundry was not closed during the litigation.

The P. H. & F. M. Roots Co., of Connersville, Ind., reports a very remarkable performance of one of its blowers. One of its men visited the Stamford Foundry Co's plant at Stamford, Conn., and was shown a No. 4 Roots Foundry Blower that was installed in July, 1868, and has been in constant use since that time, melting from 5 to 6 tons of iron per hour six days in the week. The engineer who made the installation is still in charge and the company has never had to purchase a dollar's worth of repairs.

W. H. Oetting and Larry Dauer, of Chester, Ill., have purchased the Baronowsky Foundry, of Chester, Ill., and expect to operate it to its full capacity.

The Illinois Foundry & Engineering Co., of Granite City, Ill., has just completed a pattern storage of steel construction which gives the company 4,000 feet of additional floor space for pattern storage. It also reports that business is extremely good and that it has a large number of orders on its books for the future.

W. Toepfer & Sons, Milwaukee, founders of the brewers and maltsters' iron works, on May 17, celebrated their fiftieth anniversary. Wenzel Toepfer, who laid the foundations of the buildings in 1855, was an inventor and a mechanical genius.

Carroll Bros., iron founders and machinists, Houghton, Mich., are planning the installation of steel foundries during the summer. The company has just completed a new foundry, 70 x 190 ft. A machine and blacksmith shop will also be constructed.

The Hofeller-Brooks Aluminum & Brass Foundry Co., Detroit, Mich., has been organized to manufacture all kinds of metal and metallic compounds, with a capital of $6,000. The stockholders are Gordon D. Brooks, William J. Brooks, Theodore Hofeller and Julius Hofeller.

As reported in the issue of June 1, the Nordberg Mfg. Co., Milwaukee, has leased the foundry of the William Bayley & Sons Co. and secured possession long before the last named company became bankrupt.

The Neenah Brass Co., of Neenah, Wis., has been incorporated with a capital of $10,000. The incorporators are William Walker, Wilhelm Kahler, Henry Horkman and Alfred B. Meyer.

The name of the Bicknell Hardware Co., of Janesville, Wis., has been changed to that of the Bicknell Mfg. & Supply Co., the change being made to indicate more clearly the line manufactured, as the company is now interested in heavy jobbing lines.

The plant of the Three Rivers foundry, Three Rivers, Mich., has been greatly increased and the office has been moved to a new building. The change became necessary by reason of the increasing business.

At the annual meeting of the stockholders of the South Baltimore Steel Car & Foundry Co., Baltimore, Md., the directors were reelected for the coming year. Mr. Howard Carlton has been elected president and Mr. Chas. T. Crane as chairman of the board.

The Phoenix Foundry Co., 78 Garfield avenue, Jersey City, N. J., has been incorporated to manufacture iron, castings, fittings, etc. The capital stock is $50,000. The incorporators are: William D. Bliss, 116 Scotland street, Orange, N. J.; William W. Batly, 313 East Ferry street, Newark, N. J.; Thomas Owen, 515 East Ferry street, Newark, N. J.

The Bessemer Foundry & Machine Co., Bessemer, Ala., is making arrangements to install $20,000 worth of new machinery in its plant, the large orders which the company is

constantly receiving making it necessary to increase the capacity of the plant.

The Bacon Equipment Co., of Albany, Ga., now has its new plant, including the foundry, in operation.

B. F. Avery & Sons, Louisville, Ky., are negotiating for the purchase of 50 acres of land to increase their plant, but the plans are not sufficiently matured to justify publication.

The Davis Foundry & Machine Co., Rome, Ga., has been organized with a $25,000 capital for the manufacture of turbine water wheels and ore washers and to do a general repair and machinery supply business. The company will erect a plant in Rome, Ga.

The Pipe Building Machine Co., Charlotte, N. C., has been incorporated with $100,000, capital stock. The incorporators are: J. W. Conway, W. H. Sneads and H. S. Hall. The objects of this concern are to conduct a general machine shop and foundry business, and to manufacture and deal in pipe bending machines.

The Buena Vista Foundry Co., of Clifton Forge, Va., has been incorporated with a capital of $25,000. The incorporators are: W. W. Taylor, president and director, J. L. Buzzard, secretary and treasurer, both of Clifton Forge, Va., and R. L. Parrish, director, of Covington, Va.

The Union Machine Co., of Nashville, Tenn., has made application to amend its charter, changing the name to the Union Machine & Supply Co. and increasing the capital stock from $25,000 to $60,000. Both the shops and the foundry will be enlarged. The officers are T. H. Warren, president; W. H. Gordon, secretary and treasurer, and Geo. Hare, general manager.

A deal has been consummated by which the Radford Pipe Works, of Radford, Va., have passed into the possession of the Lynchburg Foundry Co., of Lynchburg, Va., of which Henry E. McWane is president. The Radford plant is now being operated by the Glamorgan Foundry Co., of Lynchburg, Va.

Robert S. Moore, for 25 years with the Risdon Iron Works, and John T. Scott, for ten years with the Union Iron Works, have purchased the National Iron Works, of San Francisco, from Marschutz & Cantrell, and have already taken possession. The plant under the new management will make a specialty of marine repairs and continue the business formerly conducted.

The Wiggins Sad Iron & Foundry Co., of Waco, Tex., has been incorporated with a capital of $10,000, to manufacture sad irons, sash weights, etc. The incorporators are O. B. Wiggins, Chas. P. Wiggins, R. D. Powell and J. D Williamson, all of Waco.

The Duffy-Trowbridge Stove Mfg. Co., of Hannibal, Mo., has elected the following directors for the ensuing year: C. H. Trowbridge, C. A. Trowbridge, Morris Cochran, Geo. W. Dulany and W. F. Chamberlain.

The Oxnard Foundry & Iron Works, of Oxnard, Cal., has been incorporated with a capital of $25,000. Its directors include J. A. Driffil, J. F. Fulkerson, M. V. Carr, John Kastle, and W. S. Saviers, all residents of Oxnard.

The Standard Iron Works, of Prescott, Ariz., has amended its charter, changing the name to the Prescott Iron Works, and making such other changes in the charter as were necessary for the transaction of its business. The company was formerly located at Phoenix, Ariz.

The Marshalltown Aluminum & Brass Foundry Co., of Marshalltown, Ia., has been incorporated with a capital of $5,000. The incorporators are Chas. Glick, I. T. Forbes, P. M. Bentley, E. L. Williams and Robert Wishert.

The Guthrie Commercial Club, of Guthrie, Okla. has accepted the proposition of the Oak Hill Foundry & Machine Co., of Oak Hill, O., to remove its plant to Guthrie. The company receives a site and a bonus of $5,000 for the transfer.

The Fargo Foundry Co., of Fargo, N. D., has been incorporated with a capital of $50,000. The incorporators are Thos. L. Sykes, of Fargo, and H. J. Kellman and F. W. Parsons, of Litchfield, Minn.

The Terrell Foundry & Machine Co., of Terrell, Texas., has increased its capital stock from $10,000 to $15,000.

Brown & McKie, owners of the Boundary Iron Works, of Grand Forks, B. C., are turning their business into a joint stock company with a capital of $25,000. The firm started business three years ago in a small way, but has been very successful.

The York Pattern Works, of York City, Pa., has taken out a permit for the building of a modern pattern plant which will be equipped with the latest of modern machinery.

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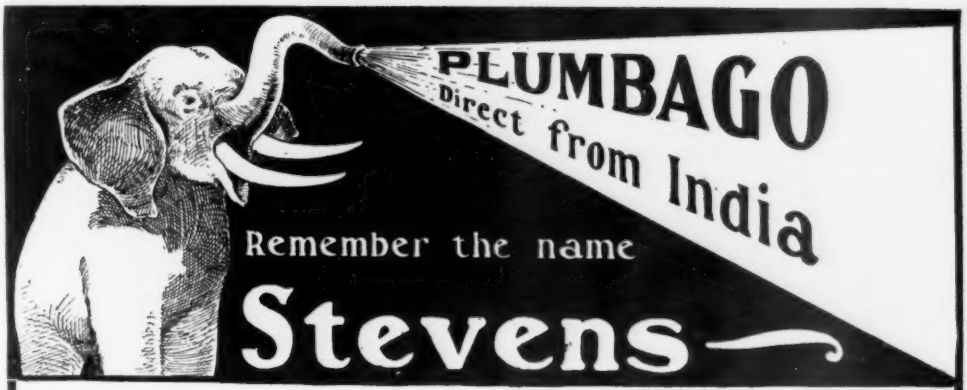

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WANTED.—Bench molders for light malleable castings. Apply McKinnon Dash & Metal Works Co., St. Catharines, Ont.

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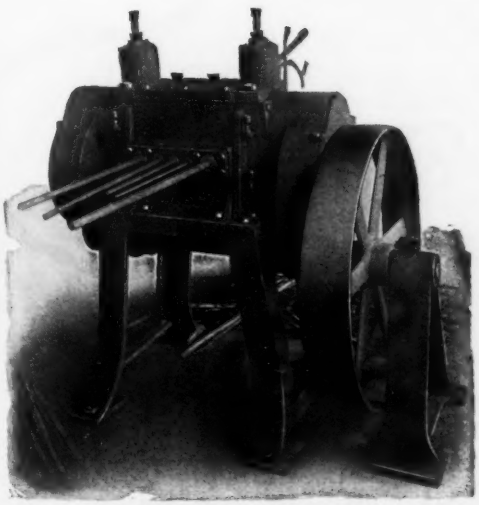

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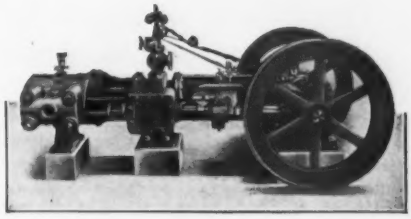

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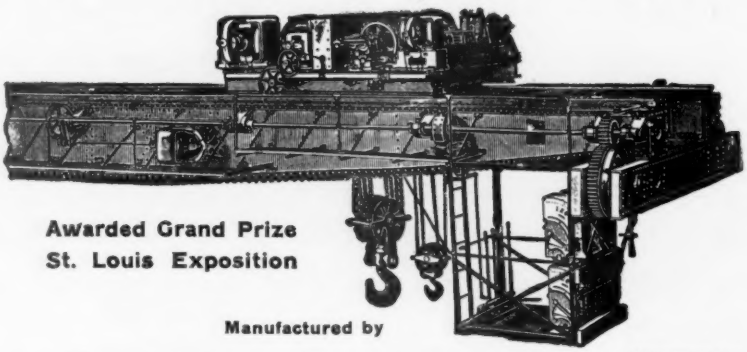

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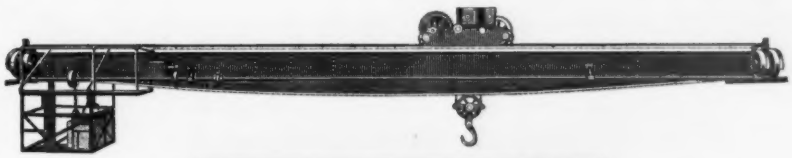

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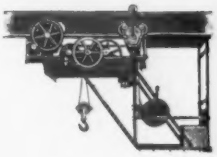

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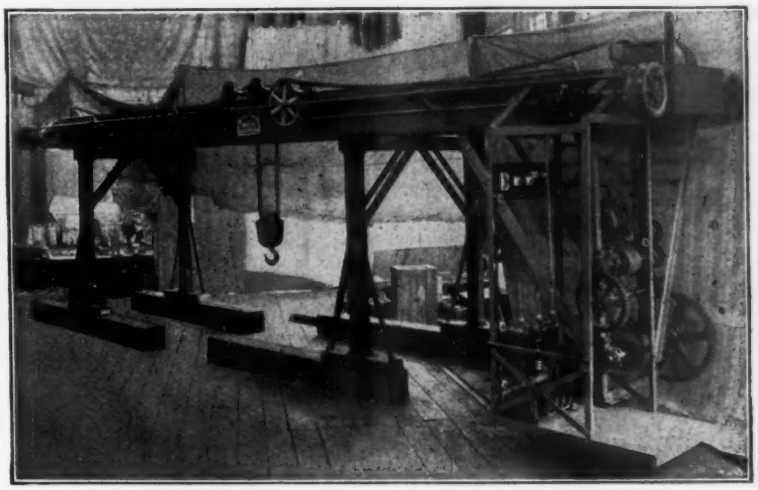

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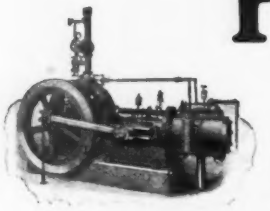

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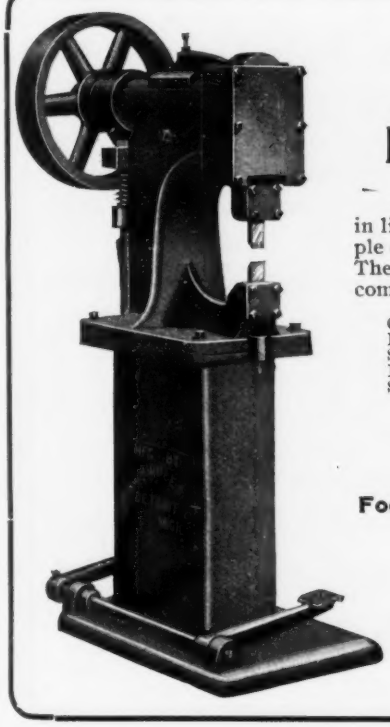

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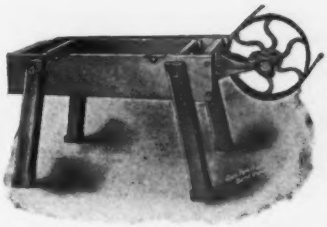

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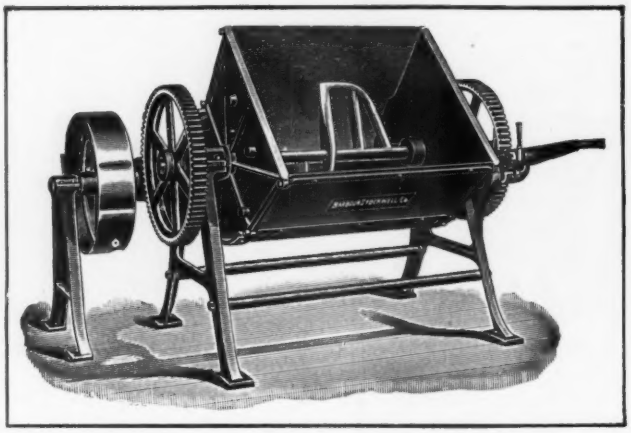
Boston Foundry Mixer

The Best Sand Mixer on the Market.



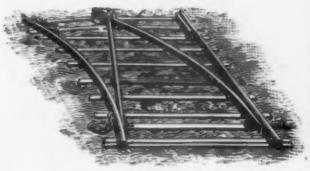
Driven by Belt or by Motor.

For particulars write

BARBOUR-STOCKWELL CO.

205 Broadway, CAMBRIDGEPORT, MASS.

No. 230
Triple Deck Oven Car



No. 1010
One Way Right Hand Switch
Foot Throw

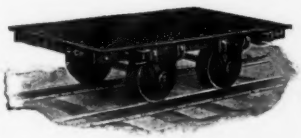
The Atlas Car & Mfg. Co.

CLEVELAND, OHIO.

Manufacturers of

Small Cars of all kinds for various purposes, Sand Buckets, Turntables, Rails, Frogs, Switches, Etc.

Foundry Equipment a Specialty.

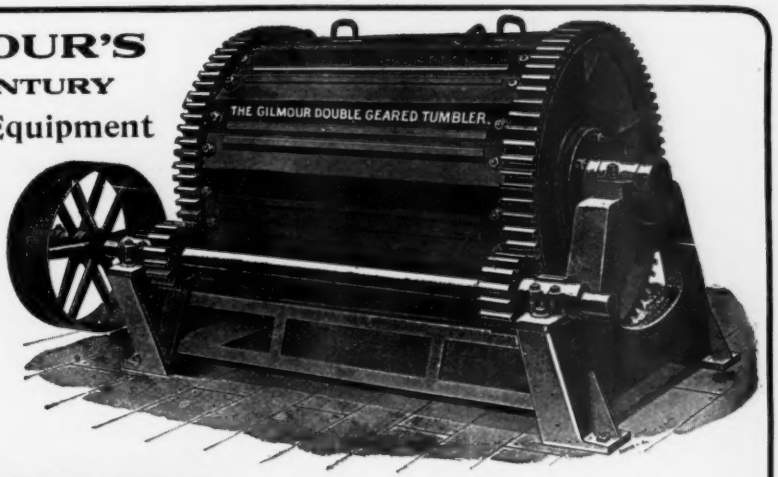


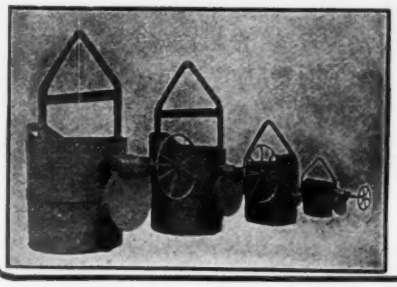
No. 287
General Purpose Car. Made in sizes to order

No. 145
Ball Bearing Turntable. Made in sizes from 4 ft. to 11 ft. in diameter

GILMOUR'S
20th CENTURY
Foundry Equipment

CUPOLAS
TUMBLERS
TRUCKS
CRANES
LADLES



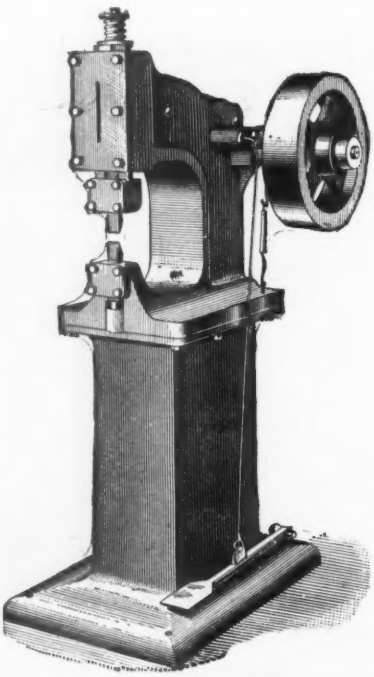


Gilmour's Double Spur-Geared Tumbler

is the longest-lived and most practical mill ever put on the market. Let us tell you more about it.

J. GILMOUR

Bennett Building New York



Don't Hesitate

to invest in whatever saves labor.
Every blow of the hammer on the chisel in the old chip, chipping away way of cutting gates from castings, trims down the margin of profit.

A Shuster
Power or Foot Lever
Sprue Cutter

operated by one man will do more than a dozen men can in the hammer and chisel way and the castings will be trimmed cleaner and closer.
We make a specialty of building automatic labor saving machinery.

Catalogue for the asking.

F. B. Shuster Co.
Formerly John Adt & Son.
New Haven, Conn.

"Ajax Plastic Bronze"

Now universally recognized as

The Standard Bearing Metal

FOR

Roll-neck Bearings, Locomotive Driving Brasses, Automobile Bearings, Machinery Bearings, Bushings, and all other wearing surfaces.

Already adopted by the leading Railroads, Rolling Mills, Locomotive Builders and Machinery Manufacturers.

Sold in Ingots and Castings

By

THE AJAX METAL COMPANY

Patentees and Sole Manufacturers

Philadelphia, Pa.

Hardness-Strength-Quick Setting

Three superior qualities in

X-Cel-All Steel Cement

For filling blow-holes, cracks, blemishes, etc., in iron and steel castings use no other.

Send for Sample.

Get our catalog of supplies:—

Leather and Wood Fillet.

Pattern Letters and Figures.

Brass and Hardwood Dowels.

Rapping Plates, Chaplets, Etc.

PROMPT SHIPMENTS PRICES RIGHT SEND FOR CATALOG

The Shanafelt Mfg. Co.

Successors to

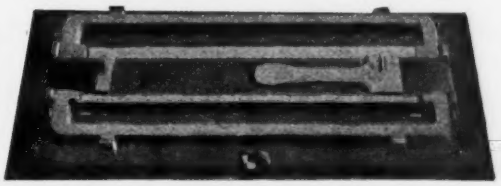
The Canton Fillet Co.

Established 1893 **CANTON, OHIO, U. S. A.**

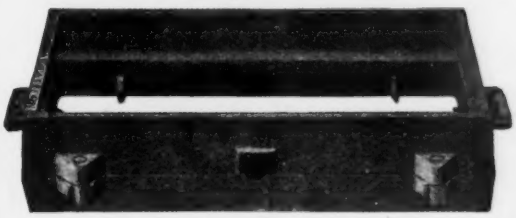
"KEEP'S TEST" OR MECHANICAL ANALYSIS

MECHANICAL ANALYSIS.

Taper steel scale which measures shrinkage.



Iron follow-board with yokes and brass patterns for test bars ½" □ × 12" long.



Iron Flask.

3 cents and 15 minutes' time each day saves hundreds of dollars.

Regulates quality of castings.

Accurate in hands of any one.

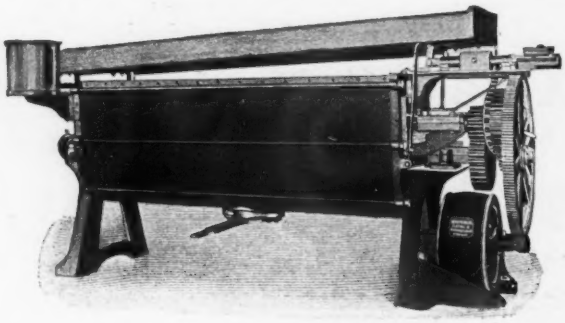
Send for circulars to

W. J. KEEP,

DETROIT. - - MICH.

The Standard Sand Mixer and Screen Combined

Best in the World



With or without Direct Motor attached

If it is of any advantage to reduce your labor one-half or three-fourths. and your flour, resin, sea coal, or any other material used in mixing, and get twenty times better results, do as all other up-to-date foundries do: install one or more Standard Mixers.

Do not forget the fact that when in need of Molding Sand, we lead them all with the best grades on the market.

Ask for catalog and prices.

The Standard Sand & Machine Co., 1507 St. Clair Street CLEVELAND, OHIO

The Adams Snap Flask

Selected Dry Cherry

1 1-16 inches thick, is used in our flasks which alone costs more than all of the material used in the ordinary flask.

Corners

of the flask are machine locked, giving greater surface for gluing and a stronger joint than is possible to obtain from a dovetail or mitre.

Trimmings

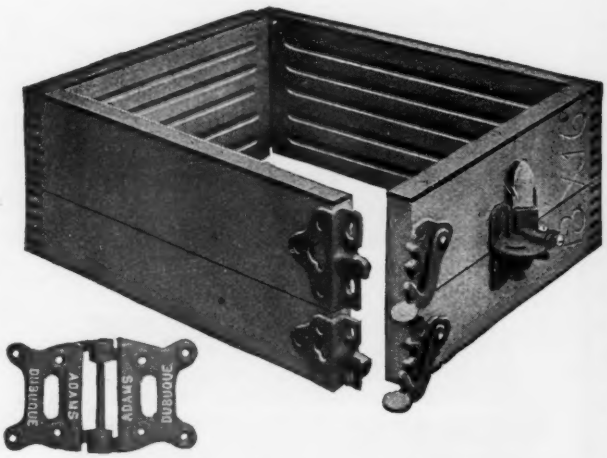
are of malleable iron. The snaps are without doubt the quickest snaps to operate.

Top Irons

which protect the edges of both cope and drag are ⅛ x 1 inch wrought iron with WELDED CORNERS, which make the flask more rigid.

Pins and Ears

of malleable iron, with ¾ inch milled bearing on each side of the right angle. Fine adjustment in both ears is provided by means of a screw on the ends of the ears Both ears being adjustable, cope and drag are easily kept in line.



THE ADAMS COMPANY

Dubuque, Iowa, U. S. A.